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ABSTRACT

Disaster is a fact of life. More than 68 disasters occur every day in the United States. These catastrophes range from hurricanes, tornadoes and earthquakes to train wrecks and neighborhood fires. All people face these and many other kinds of disasters, both natural and man-made. Air and water pollution, industrial accidents, and the possibility of attack on this country are other hazards that are constantly with us. This book is an attempt to help the reader live safely in this increasingly complex, cluttered and dangerous world. Personal safety is the first objective. As more people become knowledgeable about civil preparedness, there will be more safety for all. (Author/FC)

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YOUR CHANCE TO LIVE

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The Laboratory was established through a Joint Powers Agreement in February 1966. Signatories as of September 1972 include:
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Disaster is a fact of life. More than 25,000 disasters large and small strike somewhere in the United States each year. That's more than 68 disasters every day. These catastrophes range from hurricanes and tornadoes, earthquakes with massive destruction, to train wrecks and neighborhood fires.

We face these and many other kinds of disasters, both natural and man-made. Air and water pollution, industrial accidents, and the possibility of attack on this country are other hazards that are constantly with us.

This book is an attempt to help you live safely in this increasingly complex, cluttered, and dangerous world.

Even a nodding acquaintance with some of the dangers of everyday life and what to do about them can help. And if you're motivated to preparedness actions by what you read here, so much the better.

Your personal safety is the first objective. Your awareness, your knowledge and experience, can also provide safety for others.

introduction

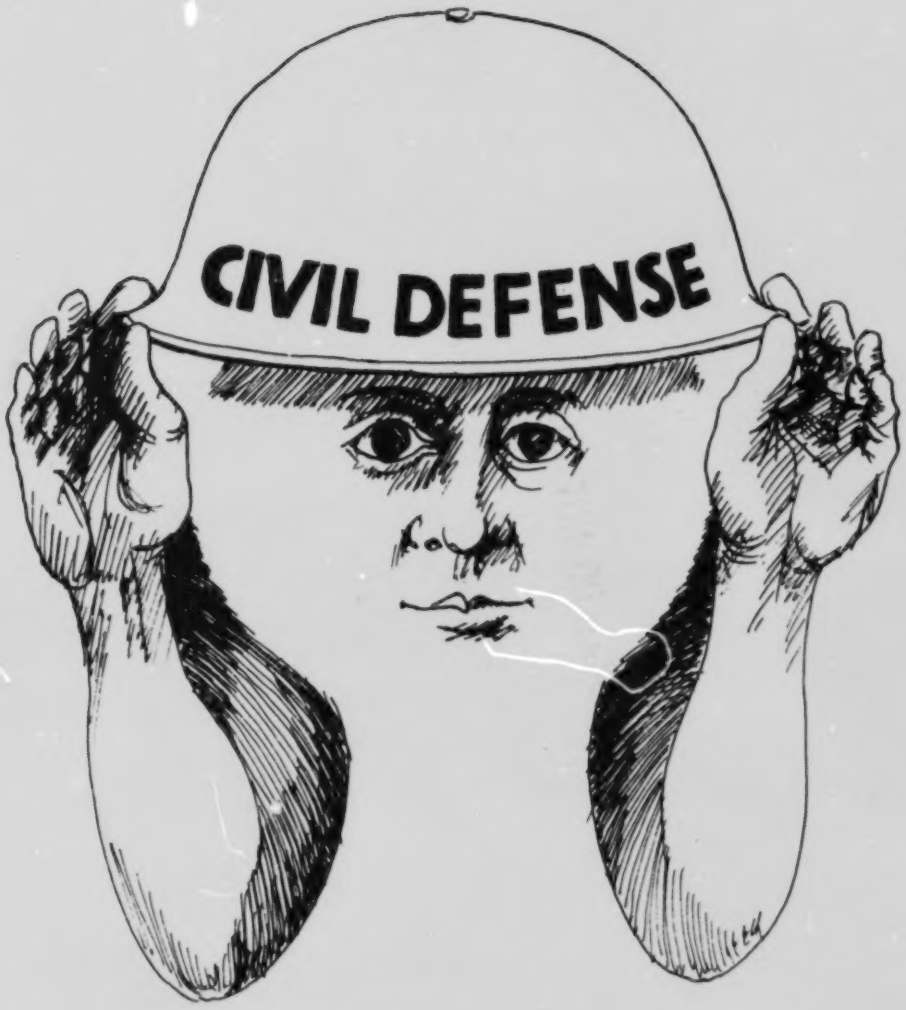
Government—Federal, State, local—is basically responsible for the public safety. But you are the starting point in family, neighborhood, community, and nationwide preparedness.

In this book you will meet Professor Quantle, and learn of the planned landing at Devil's Elbow; perhaps get a little muddy while listening to Ralph and Marvin down at the pig pen; ride with the Zorks as they head for the Gulf; and rejoice in the Feary Tale of Sanderella, who finds her Prince in a snowbank. Reggie and Danny, Albert Einstein, and Cassius the Roman winemaker are in the book, too—but read on:

A federal agency has issued this book as part of its responsibility for your safety, and for overall national preparedness and security.

The text, format, and illustrations of the book do not conform to the stereotyped image of a government publication.

You may even enjoy reading it!



PREPARE YOURSELF

A Quick Once-Over

Imagine that right now—as you sit with this book in your hands—a fire is raging in the next room. What can you do in the next few minutes to put it out—or to save your life and the lives of those around you?

Will you open the door before feeling it to see if it's hot? Or will you simply fling it open and bolt through? Do you know how to escape from the room you're in if you can't get out by the door? Where are the fire exits? Where's the fire alarm box or phone? If the room is getting smoky, should you stay upright, or get down near the floor?

Which way do you go if you see a tornado coming—in any direction, or at right angles to it? If there's no time to escape, or to get into a storm cellar or basement, should you climb a tree? Or jump in the nearest ditch or low place, and lie with your arms over your head for protection?

If there's a hurricane or other storm coming, should you leave a window open on the side of the house *away* from the direction of the wind? Or should you leave all windows open, so the wind can blow through the house?

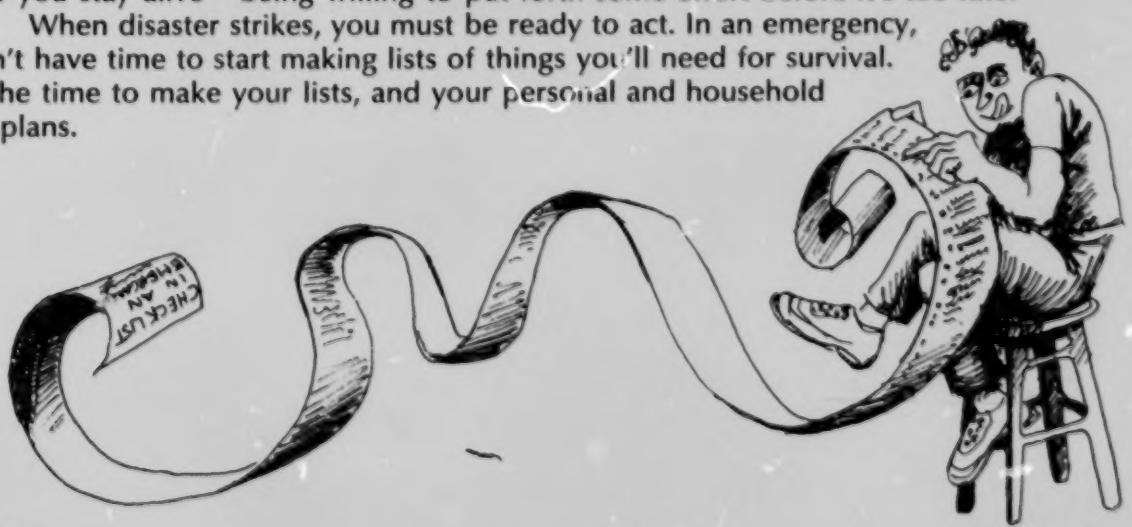
If there's a nuclear explosion and you have to go to a fallout shelter, how long would you have to stay in it? Two days? Two weeks? What is the most important item to store in any shelter?

This book answers these and many other questions, and provides information you need in order to avoid or survive natural or manmade disasters. The purpose of this book is to help you think and plan *now*. Then, if you ever face disaster, you'll be ready to act sensibly, with knowledge and foresight.

To Be Prepared

Many of the suggestions in this book may seem like a lot of trouble to carry out: some you might even feel unnecessary. Preparation *is* a little troublesome—like making sure the safety of a gun is on, looking before you walk into the street, or plugging up leaks in your boat before you sail out to sea. But this kind of "trouble" is what can help you stay alive—being willing to put forth some effort before it's too late.

When disaster strikes, you must be ready to act. In an emergency, you won't have time to start making lists of things you'll need for survival. *Now* is the time to make your lists, and your personal and household survival plans.



SOME BASIC FIRST STEPS

Know the Warning Signals

How will you know when danger threatens? Most communities in the United States have siren warning systems. These usually are tested at specific times, so you may already be familiar with their sound. *When the sirens sound in a steady tone for 3 to 5 minutes, it's an alert that a peacetime emergency is occurring.* You should immediately tune in your radio or television to learn what the emergency is and what you should do about it.

If the sirens sound a wavering tone for 3 to 5 minutes, enemy attack has been detected. You should take immediate protective action.

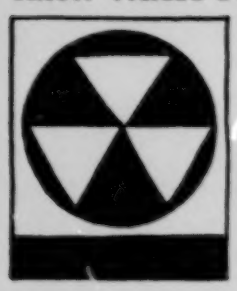
If there is an attack, official information and instructions will be broadcast. Turn on your radio or television.

If the emergency is a natural disaster, such as a hurricane, flood, or tornado, the radio or television may tell you there is a *watch*. This will give you some time to prepare for the possible danger. In the case of a tornado, a watch could last for a relatively short time, and in the case of an expected hurricane, perhaps a little longer.

If the emergency is expected immediately, the radio or television will give you a *warning*.

That means the danger has actually begun—the tornado has been sighted, or the river has overflowed its banks and begun to flood. You must immediately follow emergency instructions, or go to the safest place available.

Know Where Public Shelters Are Located



Most communities have public fallout shelters marked with yellow-and-black signs. Each public shelter offers radiation shielding. Many of these shelter areas have been stocked with emergency water and food, medical supplies, sanitation kits, and radiation monitoring instruments.

Locate *now* the public fallout shelter that your local government wants you to go to if radioactive fallout (or other disaster) threatens. Your community should have a plan for sheltering all its citizens, wherever they might be, at any time of day or night. If there is no plan, locate the public fallout shelter nearest your home, work, or school.

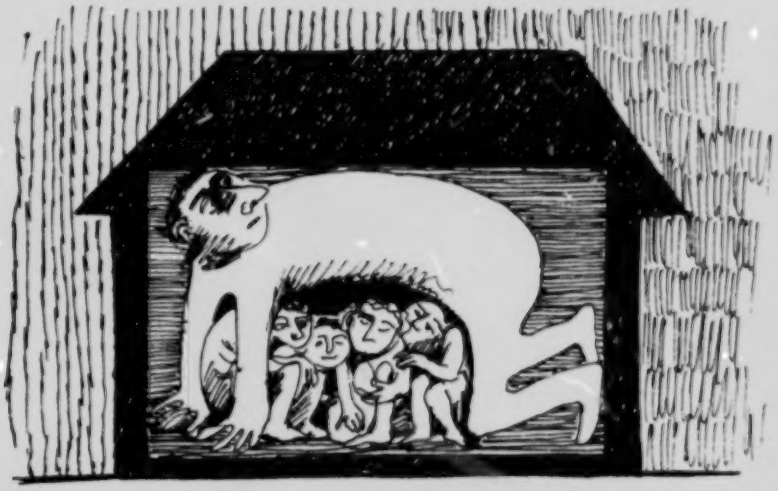
If you know your public fallout shelter is stocked, and have to go there, simply take along special family medicines, blankets, and a battery-powered radio. If the shelter is not stocked, you will need in addition as much water or other liquids and ready-to-eat foods as you can carry. Keep part of your family's emergency food

supplies in a small box or other portable container, so you won't lose precious time if you're forced to leave your house quickly.

Don't forget to secure your house before you leave it. Travel carefully on your way to shelter.

Know How To Be Prepared at Home

Under emergency conditions, the most important survival items are shelter, water, food, warm clothing and blankets, and sanitary facilities. Once you have reached shelter, you can survive for a surprisingly long time without food, but you can live for only a few days without water. In a fallout situation, you probably would have to stay in shelter for at least 24 to 48 hours. The stay-time could range up to 2 weeks. So a home survival plan should include a 2-week supply of essentials for each member of the household.



Home Shelter

There are many reasons why you may need to prepare shelter areas in your home. You may be too far from public fallout shelters to get to them in time; or weather conditions, or possibly sickness, could make travel impossible.

Usually, any area of your house that's below ground or away from outside walls would be the safest. You can consult the section on home shelters in this handbook or ask your teacher for more information on building and stocking home shelters. Fallout shelters can be designed also to serve as shelters from severe storms. Here's a list of supplies you need in shelter:

Water

Water is the most essential item to store in any shelter. A minimum supply is 2 quarts per person daily, although a gallon would be better. That amounts to 14 gallons per person over a 2-week period.

Store the water in sealed plastic (unbreakable) containers. The water may acquire an unpleasant taste after being stored for some time, but it will remain safe to drink. Also, water in your hot-water heater and toilet tanks (not the bowls) can be used safely.

Additional water can be obtained from the home plumbing system if the main water valve is shut off before the emergency to seal the water in the pipes.

A faucet in the upper part of the house should be left open to allow air to enter the pipes, and the water should be drawn off from the lowest faucet or pipe.

Water purification tablets should be included in your emergency supplies in case it is necessary to use cloudy water from sources that may not be clean. (Cloudy water can be filtered through several thicknesses of clean cloth and allowed to settle before it is purified.) Ordinary household bleach can be used to purify water if chlorine is the only active material in the bleach.

For each gallon of water, use 4 water-purifying tablets, or 12 drops of tincture of iodine or 8 drops of liquid chlorine bleach. If the water is cloudy, these amounts should be doubled.

Food

Your family should build up and maintain a 2-week supply of nonperishable food in the house, rotating and replacing it regularly to ensure freshness. This food should require little or no cooking and be packed in containers small enough so the contents can be used in a single meal. Perishable foods on hand at the time of an emergency should be eaten first. There may be no gas or electricity available in your home for cooking or refrigeration; and neither open flames nor charcoal burners should be used in a shelter area. Also, *do not* store volatile fuels in a shelter area. It's better to eat cold food than to run the risk of fire, explosion, or poisoning by fumes when you are confined in a shelter.

When choosing foods for storage, your family should include those which:

require little or no water for preparation.
can be eaten without heating.
are packaged in one-meal sizes.
require minimum storage space.
have a long shelf-life.
can be rotated in your home food supply.
your family likes.

Be sure to keep all food in covered containers. Keep cooking and eating utensils clean. Keep garbage in a closed container and dispose of it outside the home when it's safe to do so.

When you choose food for your family stockpile, select those which will provide good nutrition. Here are some suggestions:

1 Beverages—powdered or canned fruit and vegetable juices; powdered coffee, tea and milk; canned milk.
2 Prepared foods—canned hash, spagnetti dinners, salmon, tuna, chicken and noodles, baked beans and frankfurters (without tomato sauce), corned beef.
3 Canned vegetables and fruits (which also provide liquid).
4 Crackers and cookies.
5 Spreads for crackers—peanut butter, cheese spreads, canned meat spreads.
6 Soups, canned or in dry packages (not tomato).
7 Sugar, salt, and pepper.
8 Special foods needed for invalids or infants.
9 Utensils—paper plates, plastic cups, knives, forks, spoons, pans, can and bottle openers, and a camp stove if practical.

Clothing and Blankets

Camping equipment, such as sleeping bags and air mattresses, can be stored in the home shelter area when not in use. A change of clothing for each member of the household and any extra blankets in the house should be stored in the shelter. Someone in the house should take the responsibility for collecting blankets and pillows and bringing them to the home shelter when an emergency is declared.

Sanitary Facilities

An emergency toilet can be constructed from a watertight container with a snug-fitting lid. It could be a garbage container or pail or bucket—but it must be covered. If the container is small, a larger covered container should be available into which the contents of the small one can be emptied when necessary. Both containers should be lined with plastic bags; and you should keep extra bags on hand. After each use, add a small amount of disinfectant or chlorine bleach to the container to check odor and germs. Then replace the lid.

CHECKLIST OF SANITATION SUPPLIES

small can with tight lid
garbage can with lid
plastic bags to fit both cans
newspapers
toilet paper
sanitary napkins
disinfectant or bleach
deodorizer
small wash pan
soap
towels
razor and razor blades
toothbrushes and toothpaste
combs and hairbrushes

Medical Supplies

A first aid kit (containing bandages, antiseptic, and other items) is always useful. It can be stored in your shelter area, along with a first aid handbook. Store this handbook there too. Any special medicines used by members of your household should be included. In addition, some member of your household should be trained in first aid and medical self-help.

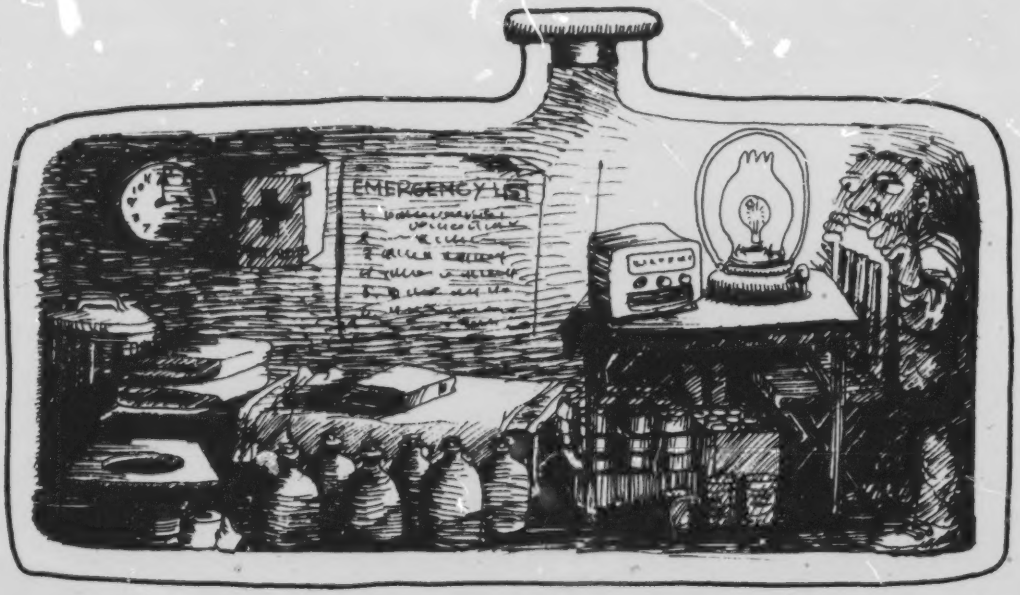
adhesive tape, roll 2" wide
applicators, sterile, cotton-tipped
antiseptic solution
aspirin tablets, 5 grain
bandage, sterile roll, 2" wide
bandage, sterile roll, 4" wide
bandages, large triangular (37"x37"x52")
bandages, can of plastic strips, assorted sizes
cotton, sterile absorbent
cough mixture
diarrhea medication
dressings, sterile (4"x4")
ear drops
first-aid handbook
laxative
motion sickness tablets (for nausea)
nose drops (water soluble)
petroleum jelly
rubbing alcohol
smelling salts
safety pins, assorted sizes
soap
specific medications recommended by your physician
scissors
splints, wooden (18" long)
table salt
toothache remedy
thermometer
tweezers
water purification materials

Equipment

Two of the most important items for any home shelter are a battery-operated radio and a flashlight, along with a supply of extra batteries. A radio provides a vital link to the outside, giving you information about the emergency and letting you know when it will be safe to leave shelter.

CHECKLIST OF USEFUL SHELTER EQUIPMENT

battery-operated radio
flashlight
extra batteries
cooking and eating utensils
bottle and can openers
matches and candles
lanterns
tools, including wrench, screwdriver, pliers, hammer, crowbar, saw, axe, shovel, and broom
sanitation supplies
first-aid kit
rope, 25' long
cots or bunks
folding tables and chairs
games and puzzles
paper, pencils, and crayons
reading materials
sewing kit
clock (windup or battery-operated)
calendar
string
playing cards



Prepare Your Family Emergency Plan

No two family emergency plans will be alike, but there are certain essentials each person in the household should know. Each family member should assume responsibility for some part of the emergency plan.

PRE-EMERGENCY CHECKLIST

1 *Family members know actions to take on warning signals.*
2 *Family members know family emergency-action plan.*
3 *Family members know how to turn off utilities.*
4 *Home fire prevention is practiced, and periodic checks are made.*
5 *Family members know what to do in case of fire.*
6 *Family members know what to do if a nuclear flash, earthquake, or other sudden danger threatens.*
7 *An adequate supply of water and food is stored.*
8 *A battery-operated radio and flashlights, with spare batteries, are on hand.*
9 *The family emergency-action plan is tested periodically.*

An example Family Emergency Plan follows. As you fill in the blanks, you will become better prepared to act in any emergency.

AN OUTLINE FOR FAMILY EMERGENCY PLANNING

Public fallout shelter nearest our home is located at:

_____

The best route from our home to this shelter is:

_____

The location in our home that offers the best fallout protection is:

_____

Nearest shelter to work/school:

_____

Best route planned? _____

Is assistance needed to reach shelter? _____

Who will provide? _____

Names of family members:

Family member responsible for:

Home shelter area water				
Home shelter area food				
Supplies to take to public shelter				
First aid and first aid kit				
Fire prevention and control				
Safe storage of vital family records				
Sanitation and sanitation supplies				
Maintenance of family shelter area				
Insure battery radio is available and working, and spare batteries on hand				
Turn off burners, close windows, secure house (turn off utilities if told to do so)				
Secure area outside house				

Names of Family Members (continued)

Special Responsibilities:				
Family pets				
Livestock				
Farm equipment				
Warn neighbors				
Special personal needs:				
Medicines				
Foods				
Infant supplies				

Checklist of supplies for family shelter area:

_____ Water
_____ Food
_____ First aid kit, health and medical items
_____ Sanitation items
_____ Battery radio, spare batteries
_____ Clothing
_____ Firefighting equipment

Items we plan to take to public shelter:

_____

_____

_____

_____

We can obtain additional planning information from:

Local Civil Defense Agency _____ Telephone _____

Address _____

State Civil Defense Agency _____ Telephone _____

Address _____

County Agricultural Agent _____ Telephone _____

Address _____

Practice Sessions

When you've read this book, and have developed a sound emergency plan with your family, you can go through a few trial runs, or practice sessions, to make sure everyone knows how to act in different emergencies.

Practice sessions should focus on those emergencies most likely to occur in your area of the country. Here are some brief examples, and the ways in which you might prepare for them. They are treated in greater detail in the chapter called *Disaster Strikes.* Imagine they are actually happening, and go through the motions of coping with them—so that when disaster does strike, your first time won't be your last.

Hurricanes

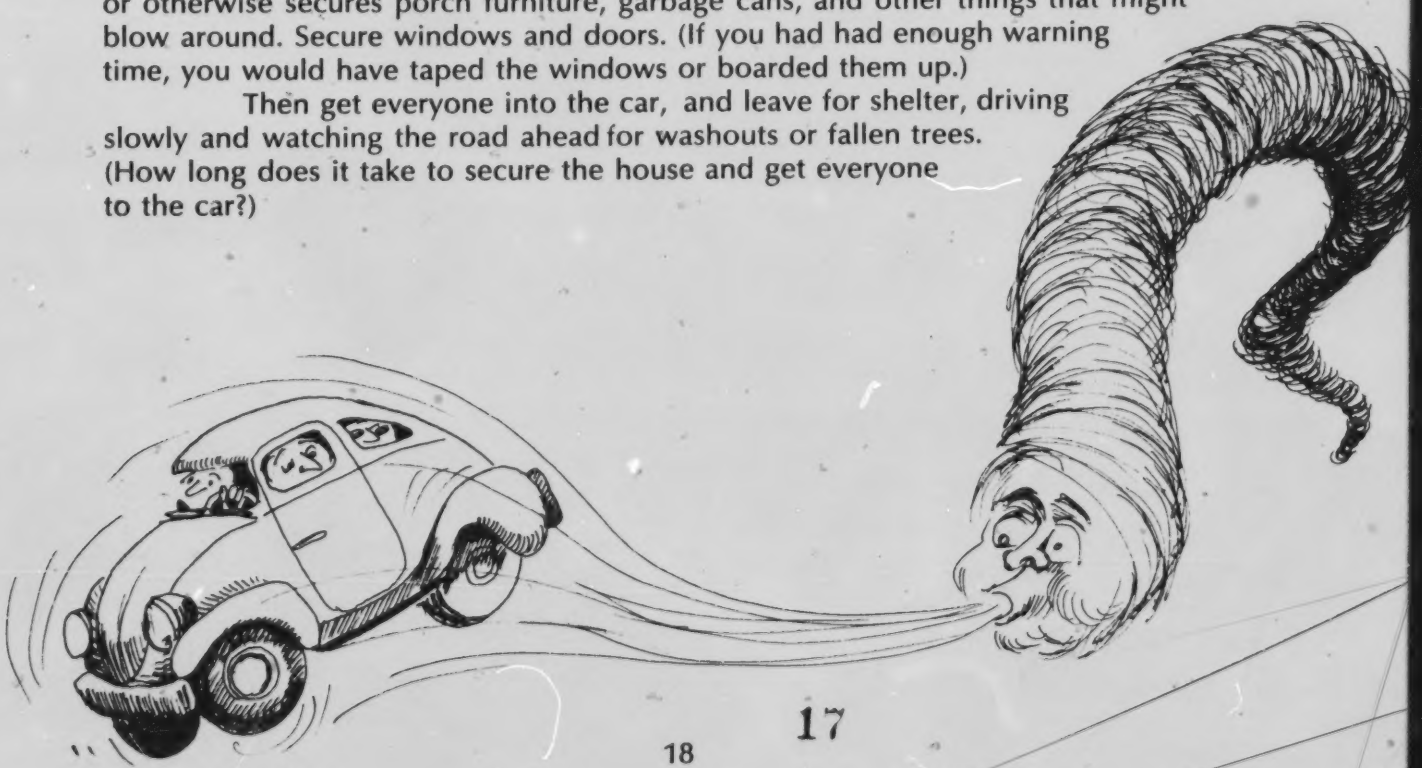
A hurricane has been following an erratic course for several days. At last reports, it is not coming toward your area. However, your town's warning sirens sound after you've gone to bed. You get up and turn on your radio or television. You learn that the hurricane has changed course and is headed your way. It's expected to arrive by daybreak. People in low-lying areas, especially near the shore, are advised to leave their houses and go to safer shelter. It is raining hard already, and some of the roads may be flooded.

What do you do?

Wake everyone. Tell them to get dressed, take care of emergency-plan tasks, and then get ready to leave for safer shelter.

One family member continues to listen to the radio for advice on road conditions and where public shelters are open. Another member places under cover or otherwise secures porch furniture, garbage cans, and other things that might blow around. Secure windows and doors. (If you had had enough warning time, you would have taped the windows or boarded them up.)

Then get everyone into the car, and leave for shelter, driving slowly and watching the road ahead for washouts or fallen trees. (How long does it take to secure the house and get everyone to the car?)



Earthquake

This is one disaster for which there is no warning. If an earthquake occurs, *stay where you are* until the initial shock has passed. If you are indoors, sit or stand against an inside wall or a strong doorway, or take cover under a desk or table. Stay away from windows and outside doors. Move away from ceiling fixtures and bookcases or china cupboards. Wait it out. There are always aftershocks, but the first few rarely last more than a minute or two. Succeeding shocks generally are weaker and of shorter duration.

After the shaking, check your household and neighborhood for injured people who need help. Then check your house for damage. If utility lines are broken, leave the area. As soon as possible, report damage which might pose a danger to yourself or others. Do not flush toilets until you know sewers are not broken. Watch out for fire. Turn on radio or TV for information. Don't go sightseeing. Stay out of damaged buildings. There probably will be aftershocks at intervals of several hours or days. In any case, it is dangerous to enter damaged buildings. Stay away from coastal areas in case tidal waves—also known as "tsunami"—should strike.

If you're outdoors when the shaking starts, move away from buildings, tall objects, and utility lines. If you're in a moving car, stop at the side of the road. If possible, don't stop on or under highway overpasses or bridges. Stay in your car; even if it shakes a great deal, it's a fairly safe place.

Tornadoes

You hear on radio or TV that there is a tornado watch. You're getting ready to leave the house. *What should you do?*

Your children are at school. If the school building has a shelter area, the children probably should remain there.

Leave your radio or TV on, to keep informed. If you must travel, listen to your car radio, and watch for low and rolling dark clouds, or funnel-shaped clouds—especially from the southwest. In the house, check your battery-operated radio and flashlights. Know how to reach storm shelter quickly.

If a tornado is reported headed in your direction, or you see one coming, don't wait—go to shelter immediately. (Remember to leave a window open on the side of the house *away* from the announced direction of the wind.

EMERGENCY SHELTER ACTION

EXAMPLES:

Take shelter in your home shelter area.

Move to a public shelter.

Take cover immediately in best available protection.

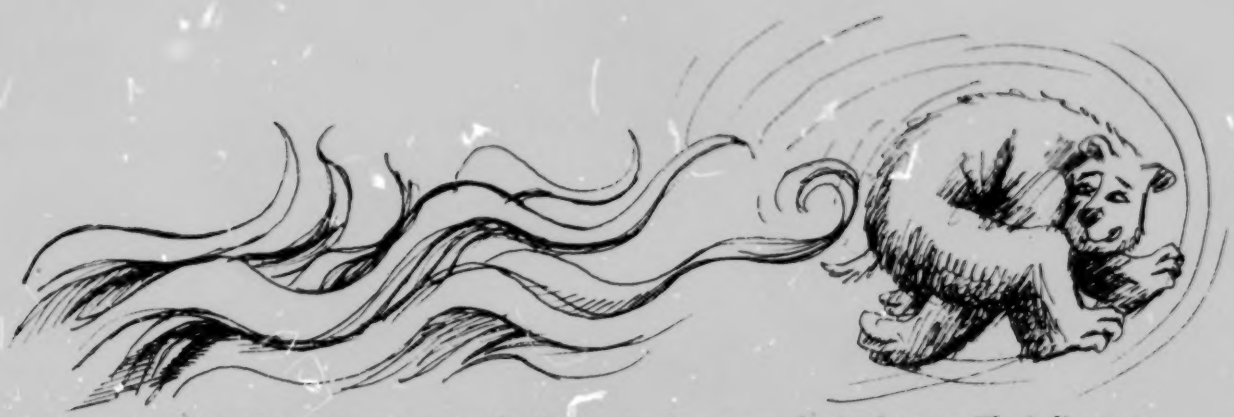
You and your family should be prepared. Practice *all* of these actions, for different emergencies demand different responses.

Many of the disasters described in this book are regional ones. If you live in Ogden, Utah, for instance, hurricanes are not going to be a pressing problem for you. Concentrate on disasters relevant to your locality.

What we say throughout the book about preparation, evacuation, and supplies required for different emergencies may sound repetitive. That's because each section is designed to be complete in itself. And anyway, it won't hurt to read and think about these things more than once. When it comes to survival, there's no such thing as too much preparation.

Disaster Strikes

FOREST FIRES



Life is short. Forest animals don't need us to make it shorter. Their lives are in our hands. When the trees and grass grow dry as tinder, will you be the one to leave burning embers at the campground?—to carelessly flick a lighted match into the underbrush?—to set a little "fun fire?"

Fun fire? There's no such thing. Even "contained" fires can get out of hand and grow like fury. A few smouldering twigs can become a rampaging blaze. A single careless toss can turn the forest world into wholesale horror. Fire destroys: burrows, nests, seeds, roots, hunting territories, mating grounds—*life*.

It takes no more than one fool to start a fire. It often takes an army of cool heads to put one out.

Man is responsible for 58% of all forest fires—and about one-third of that number are set on purpose! And people who take to the woods for recreation are responsible for one-third of all forest fires each year. So stay alert—or stay home.

Lightning causes many forest fires too, but when it strikes—whamo!—it often happens on top of a hill, where the temperature is cooler, the fuel supply is sparse, and the flames are more easily spotted.

Manmade fires, whether the culprit is an arsonist, or simply careless, usually occur in low-lying places, along trails and roads. This gives the blaze a good chance to take hold and cause a heavy toll.

An arsonist will choose a secluded place, and weather that's hot, dry, and windy. This sort of fire will spread rapidly, fed by updrafts. Forests grow slowly. Forest fires grow fast.

Animals caught by a forest fire can't outrun the flames. Think about them on your next trip, and rake the ashes of your camp fire extra carefully. You'll be glad. So will they.

The ravaging flame is often only the beginning of the destructive effects of a forest fire: A heavy California mountain rainfall roared down two canyons. The one that was forested, and covered with chapparal, naturally absorbed the water. The one that was bare, its trees and shrubs previously devastated by fire, had nothing to hold back the water, which cascaded down the canyon, deluging the town cradled in the valley, sweeping away two hundred houses and killing 34 people. Be careful. Fire kills in far-reaching ways.

Three kinds of fires can destroy the forest:

A *surface fire* burns along the floor of the forest. It is usually slow-moving and close to the ground, but it can spread fast. It kills small trees and either kills or permanently damages larger trees. Most fires are of this type.

A *ground fire* burns on or below the forest floor. These fires are often started by lightning. They move slowly, and often go undetected for weeks. They are hard to put out. The heat they create beneath the ground destroys the trees' roots and any chance for life.

A *crown fire* moves faster than most people can run. These often start as surface fires, and are blown by winds into the tree crowns. Fir forests are especially vulnerable. The needles and cones catch fire easily and quickly. A grove of trees "topping out" in this way is doomed.

A fire has to be fed, or it dies. If you want to kill one fast, cut off its supplies: *1. HEAT 2. FUEL 3. AIR.*

The main elements which influence the spread of a fire are *fuel*, *weather*, and *slope*. Fast-burning fuels are dry grass, dead leaves and tree needles, brush and small trees. These are called *light fuels*. Slow-burning fuels are logs, stumps, branchwood, and topsoil. These are *heavy fuels*.

Weather factors are wind, moisture, and temperature. Generally, the stronger the wind, the drier the air and the higher the temperature, the worse the fire problem.

High-intensity fires shoot flames 150 feet into the air. Tornado-like firewhirls spew flashes 600 feet high. A fire may spread anywhere from a few feet in a few weeks to 30 miles in an hour.

The Peshtigo Fire in 1871 took more lives than any other in the United States. Almost 1,500 people were killed and 4 million acres burned. In October of 1952, fires in Kentucky and West Virginia burned 2 million acres. In 1957, Alaska lost 5 million acres of green forest. In the decade that ended in 1961, the U.S. Forest Service recorded 1,300,000 forest fires in the United States. A total of over 70 million acres burned. In 1966, almost 286,000 acres of national forest burned.

While much is being done to update and improve firefighting, including methods of prediction, detection, and control, you must be able to do your part, too —by knowing how to prevent destructive fires from starting.

SOME BASIC FIRE PREVENTION RULES

Don't just throw that match away. Snap it in two, hold it until it's cool. Better yet, dunk it in water, or grind it into the dirt with your heel.

Crush all cigarette stubs thoroughly to be sure they're out. Then put the butt in an ashtray or empty can. Never throw a cigarette out your car window. Never drop it on a path or roadway.

Do not start campfires on private lands, or in any place where signs say "No Fires."

Where it's legal to build a campfire, make sure it's a safe one. Avoid areas of brush, thickets, or timber. An open, treeless spot, near water, is an ideal place for a fire. Scrape away all dry leaves, bark, wood, pine needles, grass, and any other tinder to make a circle of bare dirt at least 6 feet in diameter. Surround it with rocks, and build your fire in the center. You can use the scrapings for fuel.

Keep your fire small and stay with it.

Before you leave your campsite, drown your fire. Stir the coals and pour water over all. Stir again and douse again. Turn over smoldering logs and soak both sides. Wet the ground thoroughly all around the fire.

Burning trash is illegal in many places. Check it out. When burning trash on your own property, do it only on calm days, in either an incinerator or a metal can. Have water and tools on hand, and a friend nearby to help. Squelch every straying spark.

If you start or spot a fire, call the fire department, the police, or a ranger immediately. Don't give the flames a head start.

Fires spread *uphill* and *downwind*. If you encounter a fire, try to run across its path and out of its way. Get behind it or beside its flank. Don't try to outrun it. That's one race you can't afford to lose.

If you live in a forest fire area, make a safety plan.

1 *Decide which escape routes you'll use.*

2 *Decide on a possible sanctuary where you can wait out the fire.*

3 *Come to an agreement on what factors will mean "That's it, let's go!"*

And while you're planning your own exit, remember—forest animals don't have one. Their only escape is our good sense.

Parks are becoming our last chance to get out into nature. Some say the more contact we have with nature, the better our chances of being whole people. But use the opportunities sensibly.

"Lady bug, lady bug, fly away home—your house is on fire, and your children . . . ." Only caring—the simple human variety—can prevent broken homes, and burnt out hope.

HEAT WAVES

ONE SUMMER FRAN'S SIBLING, NAMED PETE,
WAS TOTALLY ZAPPED BY THE HEAT.
MY GOODNESS, SAID SHE,
I AM SOBERED TO SEE,
A PUDDLE WHERE PETE USED TO BE.

"In addition to their odd appearance, as you can see from Figure 3 on page 14 of your books, earthlings are distinguished by a variety of quirks. They are susceptible to—ah—shall we say—ah—termination, by factors so numerous that their continuation as a species is miraculous."

Professor Quantle paused, and looked slowly around the classroom. "Our superiority is so obvious I won't waste our time discussing it. I will turn instead to thoughts of our coming 'visitation'," he chuckled. His little sensor mechanisms waved gently. "We plan to arrive in Devil's Elbow, Missouri, in what they call July, as you all know. Now this time of year, which earthlings fondly refer to as 'summer,' should cause us no problems. Like almost everything else, however, it does cause *them* problems. They are pathetically delicate."

His class shook their heads in varying expressions of sympathy. The room was full of bobbing sensors.

He continued, "Earthquakes shake them up; winds blow them; microbes attack them; fire burns them; and sand buries them. Winter freezes them and summer wilts them. Actually," he muttered, "I don't think anything is very fond of them. Their ability to survive, despite such frailty, is scientifically quite fascinating. Let's examine the hazard they are most likely to face in the Northern Hemisphere in July: the heat wave.

"The source of heat on earth is the sun. If the sun were to grow cooler, the earth would freeze; hotter, it would frizzle. But even with this ideal balance, the sun poses a hazard. It can make earthlings ill, even—ah—terminate them. Let us take Americans, for instance."

There was a mild murmur of boredom from the class. "Now, now," said the instructor, "be gracious. In most years, an average of 175 Americans die from summer heat and too much sun, what they call 'excessive heat and insolation.' Of all their natural hazards, only the extreme cold of winter takes a heavier toll. Of course their natural hazards are petty compared with the unnatural horrors they invent for themselves, but that subject will be covered in depth in 'Earthlings 1B.' Now we will simply concentrate on the heat problem.

"Actual heat waves killed more than 8,000 people in the United States between 1950 and 1967. These are direct casualties. No one knows how many deaths are helped along by extreme heat or sun. Heat waves are a source of heavy stress to the human body, especially the very old or weak or sick.

"The heat wave of July, 1966, hit much of the eastern and middle continent with high temperatures and extreme humidity. St. Louis, Missouri, for example, near where we plan to land, was the scene of 246 deaths caused primarily by heat.

"Humans seems to enjoy hot weather enormously, and if they take certain protective measures, their delicate constitutions do not suffer unduly. I have managed," Quantle beamed, "to procure a list of rules and regulations they apparently must heed to escape the worst consequences of the heat. Perhaps you'd care to look them over. Oogle, would you kindly?"

As Oogle passed out Quantle's list, the Professor went on: "When earthlings follow these rules, they are far less likely to be disabled by heat sickness. But many of them are not overly intelligent, and some of them are foolhardy. Our mission, of course, is purely investigative, but as we are somewhat morally advanced, and intend to conduct ourselves with goodwill, a general preparedness for dealing with any cases of earthling collapse we may encounter will be helpful.

"I have prepared a summary of heat ailments, and their remedies. You may find it useful. You may even want to leave a few around down there, on doorsteps, or in mailboxes. Surreptitiously of course." Quantle smiled. "Just use your quaggles," he said.

Surviving the Sun

Rules sometimes are a drag. But in a heat wave,
you'll be glad you have some.

1 Slow down. High temperatures and humidity sap your energy, and put a strain on your heart. Listen to your body. If it says "go loll in the shade, friend,"—go loll.

2 Don't dry out. Excessive perspiration will make you thirsty. Obey your body—drink up. Take a salt tablet: sweating drains your normal supply, and you need it. If you are on a salt-restricted diet, of course, ask the advice of your doctor. Overuse of tablets may cause stomach upset.

3 Dress in lightweight, light-colored clothes. Light colors throw back the sun's rays. Take a tip from the Tuaregs, the dwellers of western and central Sahara. When the sun sears, they wear white cotton undergarments, and envelop themselves in white cotton or woolen cloaks, covering their heads and lower faces.

4 In a real heat wave, the best defense is to be where the heat is not. Find an air-conditioner, take in a cool movie, go shopping where they have chilled air. If you can't find air-conditioning, get out of the sun. Even a slightly stuffy room is better than stinging rays. The effects of heat exhaustion mount up. You are more likely to be in a worse way on Thursday of a heat wave than you were on Monday.

5 Don't overeat. You probably won't feel like it anyway, but stay away from heavy foods. Light salads, fruit, cottage cheese, and lots of liquids are good for you, and don't take unnecessary energy to digest.

6 Make it easy on yourself. Even on moderately hot days, ration your sun-worshipping: 5 or 10 minutes the first day, and add to it slowly. Sunburn is very painful. You probably won't die from it, but it may make you want to.

7 Pray for rain. Or snow.

Professor Quantle's Rules for Helping Heatstruck Humans

CAUTION: If any of the effects discussed below are severe, call for emergency help, or go to a doctor or emergency room.

Sunburn

When people try to cram a week's vacation into a sunny 24 hours, or if they simply fall asleep in the sun, they can expect a burn—just as real and painful as a fire burn. The skin becomes red and sore, and there may be swelling and blisters, and possibly a headache and fever.

Remedy: Take an aspirin, lie in a cool room. Soak the affected parts in cool water. For a mild sunburn, apply a sunburn remedy, cold cream, or shortening, with clean hands. Don't use butter or margarine; the salt in them may prove painful. Stay out of the sun until your burn is gone.

Heat Asthenia, or Loss of Strength

When the weather is hot and humid, one may feel generally tired, and have trouble concentrating, eating, sleeping, and breathing; one may also sweat heavily, and have a faster pulse than normal.

Remedy: Try to get into a cooler spot, perhaps a store or a movie. Drink lots of water, take a salt tablet (as long as you're not on a salt-free diet), rest as much as you can.

Heat Cramps

Strenuous activity in the heat often results in painful muscle spasms in fingers, arms, legs, and in the abdominal wall (stomach cramps). The pupils dilate with each spasm. The skin is cold and clammy, and there may be heavy sweating.

Remedy: Apply firm pressure on cramping muscles, with warm, wet towels. Drink plenty of liquids, and one-half teaspoon of salt in 4 fluid oz. of water at 15-minute intervals; one or two doses may be all that is required.

Heat Exhaustion

Long spells of high temperatures, too much exposure, and physical effort, can result in profuse sweating, weakness, vertigo, and heat cramps. These may be followed by heat exhaustion. The skin grows cold, pale and clammy, the pulse is weak, and blood pressure is low. Body temperature may go below normal. Vomiting may occur.

Remedy: Get to a cooler environment immediately; take a cool shower or bath if nothing else is available. Rest, plenty of liquids, and salt to replace depleted supplies (one-half teaspoon in 4 oz. of water) are essential. In severe cases, call a doctor.

Heat or Sun Stroke

In old and infirm people, overwhelming heat restricts sweating. Nausea, weakness, headaches, and cramps may occur. The body temperature may rise to 106° F.—the pulse pounding, blood pressure high. Armpits and groins are dry, skin is initially flushed, but later ashen or purplish. Delirium or coma is common.

Remedy: Heat stroke is an emergency. Medical care is crucial. While waiting for emergency assistance, reduce temperature by cold bath, sponging with alcohol or water, until temperature and pulse rate come down. Delay in proper treatment can cause death. If you can't get a doctor, take victim to the hospital immediately.

"Having imprinted these two lists," Professor Quantle said, "you may have concluded that summer on earth is a grim time. Actually, for most earthlings, it's the best time—life is full and easy, people are more active; children swim, go barefoot, pick fruit from trees; people stay up later, eat outdoors, go on vacations." Quantle sighed nostalgically. "It's just that, though *we* have nothing to fear from summer, almost everything poses a hazard to *humans*. They can brain themselves with a can of peaches, choke to death on a pin-sized fishbone. Keep in mind how vulnerable they are.

"Before class is dismissed, I should like to wish all of you luck on your interplanetary journey, and counsel patience. Remember, humans tend to attack what they do not recognize. Be tolerant, duck if they shoot—and remember in moments of annoyance that at some primitive time in your evolution, you too may have been human. Just be glad it's all behind you.

BOOM

It was an ordinary night on the farm, as July nights go, and Ralph and Marvin were bored. There's very little to do after 6 o'clock in the evening when you're a pig, which Marvin and Ralph were. They had finished the last bit of their dinner, and then they had discussed the day's activities, but it was a slow day around the pen.

Just now Ralph was saying he thought he was developing a touch of rheumatism, but his heart wasn't in what he was saying to Marvin. He was distracted by the oppressive quality of the evening.

The sky was heavy and it was hot. It reminded Ralph of a similar night when he was a piglet, though it wasn't a clear image. He thought he remembered lots of yelling and running around, and broken lumber all over the yard. His best friend, Evy the goose, had been killed by a piece of flying timber. Her husband, Bill, had lost all his feathers in the violent wind, and had wandered about for weeks shivering and honking pathetically.

Ralph didn't even like to think about it.

Just then, Mr. Person came strolling down from the main house. "Elsie," he called, "They say over the radio there's a tornado watch on."

"Can't hear you," his wife yelled, emerging from back of the barn. "Did you say a tornado warning?"

"No," said Mr. Person. "I said a tornado watch. A *tornado watch* means tornado formation is likely. A *tornado warning* means one has been seen or indicated by weather radar."

"Oh," sighed Mrs. Person, "then it's all right."

"I wouldn't say that," replied her husband. "It's heavy thunderstorm weather. That can mean tornadoes, lightning, and flash floods. We're in for trouble I'll bet."

Ralph shivered. "I w-wish I could k-keep a cool head in a c-catastrophe," he sighed, looking helplessly at Marvin.

Marvin looked at Ralph with compassion. "You are beautiful, but I am brave. I really shine in an emergency," he added.

"That's true," sighed Ralph. "I am lovely, but a dismal c-coward. I will put myself entirely in your hands. What shall we do?"

"First," said Marvin, "I'll tell you the rules I learned in school. Be cautious, but not panicky. If we had a radio, we would know what the storm is doing. But we can at least tell when a thunderstorm is maturing if we feel a *sudden reversal of wind direction*, a *noticeable rise in wind speed*, and a *sharp drop in temperature*. I will educate you on the various characteristics of thunderstorm safety tonight. First let's cover tornadoes, since one seems possible." Marvin cleared his throat.

Tornadoes

"We need to know the following:

1 In open country, move away from a tornado's path at right angles. If there is no time to escape, lie flat in the nearest ditch or ravine.

2 Structures with wide, freespan roofs like auditoriums, gymnasiums and schools which don't have reinforced construction are unsafe. Go to a nearby building of reinforced construction instead, or take cover outside on low, protected ground.

3 In homes, the basement is the safest place. Seek shelter under sturdy furniture if possible. If the nearest house has no basement, take cover in the center of the house, on the lowest floor, in a small room like a closet or bathroom, under sturdy furniture. Keep some windows open to help equalize pressure, but stay away from them because they may shatter.

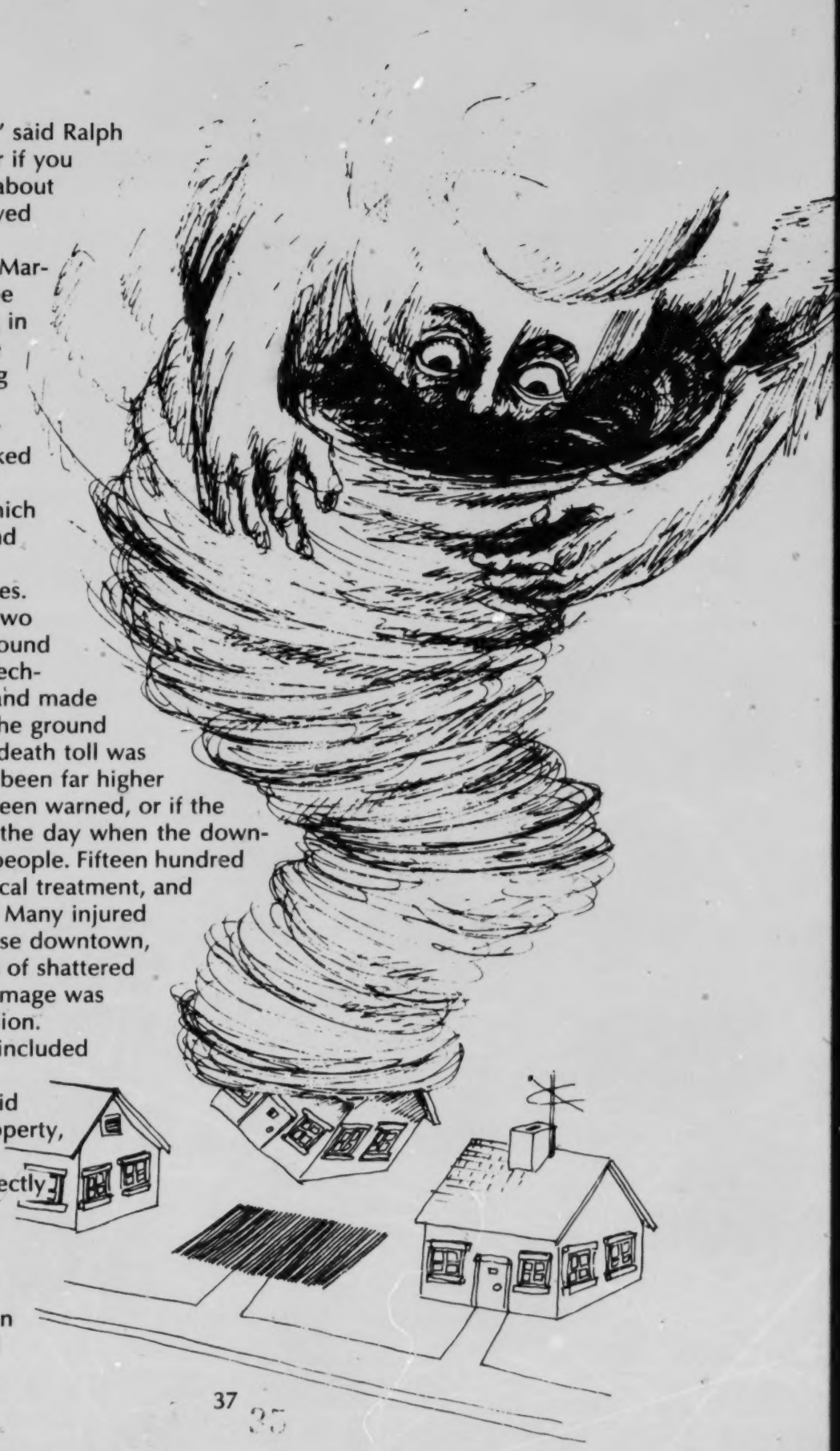
4 In shopping centers, people should go to a designated shelter area; a car is an unsafe place to be.

5 In office buildings, go to an interior hallway on the lowest floor or to a designated shelter area.

6 Mobile homes are specially dangerous during strong winds, and should be evacuated when strong winds are forecast. You can minimize destruction by securing them with cables or tie-down straps anchored in concrete footing, or with screw anchors in the soil. Mobile home parks should have a community storm shelter, and someone to monitor broadcas[illegible]during a severe storm. If there is no shelter nearby, leave the trailer park and take cover elsewhere.

"Excuse me," said Ralph timidly, "but I wonder if you could tell me a story about a tornado you have lived through."

"Sure," said Marvin expansively. "I'd be delighted. I was living in Lubbock, Texas, at the time. It was late spring —actually May 11, I believe—in the year 1970. The storm wrecked most of the northeast quarter of the city, which has 150,000 people and extends over an area roughly 10 by 8½ miles. This particular night, two tornadoes touched ground to the east of Texas Technological University, and made broken contact with the ground during their trip. The death toll was 26, which could have been far higher if the people hadn't been warned, or if the storm had hit during the day when the downtown area was full of people. Fifteen hundred people received medical treatment, and 96 were hospitalized. Many injured people, especially those downtown, were hit by fragments of shattered windows. Property damage was estimated at $200 million. Fortunately, I am not included in that figure."



"Marvin," said Ralph, "you aren't property, you're a pig."

"You're perfectly right," said Marvin. "That's very true. But people often think in rather limited terms."

"I don't mean to sound stupid," said

Marvin, "but could you tell me what a tornado actually is?"

"Actually," said Marvin, "a tornado is a column of air that rotates violently. Tornadoes descend from cumulonimbus or thunderstorm cloud systems. The vortex of a tornado is normally several hundred yards in diameter and contains winds estimated at over 300 m.p.h. Tornadoes happen on all continents, at any time of year, any hour of the day, but most occur in the United States. Their most frequent appearance in this country is in the spring, during the middle and late afternoon. Tornadoes are of short duration, but they're the most violent of all atmospheric phenomena. On the average, their paths are only a quarter of a mile wide, and only 16 miles long.

"Tornadoes form several thousand feet above the earth's surface, usually during warm, humid, unsettled weather, and in concert with a severe thunderstorm. A parent thunderstorm can spawn several tornadoes. The forward speed of tornadoes can range from almost no forward motion to 70 m.p.h."

"It all sounds rather furious," said Ralph.

"It is," said Marvin. The very best place for tornadoes to form is the continental plains of North America. In February, when tornadoes become more frequent, the center of activity is over the central Gulf States. Then during March, this center moves east to the southeast Atlantic States, where tornadoes are most numerous in April. During May, tornadoes are more frequent in the southern Plains States, and in June, north to the northern plains and the Great Lakes area, all the way to western New York State. Winter offers few encounters between warm and overriding cold systems, so tornadoes are at a low ebb by December. I hope that answers most of your questions."

"I do have one," said Ralph hesitantly. "I have heard that these winds have a sort of whirlpool structure. Is that true?"

"Why, yes," answered Marvin. "Where did you learn that?"

"Oh," said Ralph, "it's part of a government pamphlet I found in my lunch."

Lightning

"The second thing on the agenda tonight is lightning," continued Marvin. "Did you know, Ralph, that the average yearly death toll for lightning is greater than for tornadoes or hurricanes?"

"Actually I didn't," said Ralph.

"According to the National Center for Health Statistics, lightning kills about 150 Americans a year and injures about 250.

"Lightning is a secondary effect of electrification in a thunderstorm cloud system. The earth normally is charged negatively with respect to the atmosphere. Lightning occurs when the difference between the positive and negative charges becomes great enough to overcome the resistance of the insulating air, and to force a conductive path for current to flow between the two charges.

"Thunder is the crash and rumble associated with lightning, and is caused by explosive expansion of air heated by the stroke. When lightning is close by, the thunder is a sharp, explosive sound. More distant strokes produce the familiar growl and rumble of thunder.

"The distance in miles to a lightning stroke can be estimated by counting the number of seconds between lightning and thunder and dividing by five.

"Lightning comes in many forms. *Streak lightning* is a single or multiple line from cloud to ground. *Forked lightning* shows the conductive channel. *Sheet lightning* is a shapeless flash covering a broad area, often seen in cloud-to-cloud discharges. *Heat lightning* is seen along the horizon during hot weather, and is believed to be the reflection of lightning occurring beyond the horizon. *Ribbon lightning* is streak lightning whose conductive channel is moved by high winds, making successive strokes seem to parallel one another. *Beaded lightning* appears as an interrupted stroke. *Ball lightning* appears as a luminous globe, doughnut shape, or ellipsoid which hisses as it hurtles from cloud to earth, maneuvers at high speeds, rolls along structures, or hangs suspended in the air.

"With all kinds of frightening things like that which can go crashing about, I think you'd better pay attention to these lightning safety rules," Marvin concluded.

He had Ralph's attention:

1 Stay indoors. Don't go out unless absolutely necessary.

2 Stay away from open doors and windows, fireplaces, radiators, stoves, metal pipes, sinks, and plug-in electrical appliances.

3 If no buildings are available, your best protection is a cave, ditch, canyon, or under clumps of trees in open forest glades which are at least head-high.

4 When there is no shelter, avoid the highest object in the area. If only isolated trees are near, your best action is to crouch in the open, twice as far from isolated trees as the trees are high.

5 Avoid hilltops, open spaces, wire fences, metal clotheslines, exposed sheds, and any electrically conductive elevated objects.

6 Stay in the car if traveling. Cars offer great lightning protection since they rest on insulating rubber tires.

7 Get out of the water and off small boats.

8 Stop tractor work, especially when the tractor is pulling metal equipment, and dismount. Tractors and other implements in metallic contact with the ground are often struck by lightning.

9 Don't handle flammable materials in open containers.

10 Don't use metal objects like fishing rods and golf clubs. Golfers wearing cleated shoes are particularly fine lightning rods.

11 Don't work on fences, telephone or power lines, pipelines or structural fabrication.

12 Don't take laundry off the clotheslines.

13 Don't use the phone during a storm, because lightning may strike telephone lines outside.

14 Don't use plug-in electrical equipment like hair dryers, electric toothbrushes, or electric razors during the storm."

"Marvin, I don't have a car or an electric hair dryer or golf shoes. I am but a humble pig."

"Well," said Marvin, "really I like you better without all that. Simplicity is an enchanting quality."

"Thank you," said Ralph, with relief. "What should I do if someone is struck by lightning?"

"People who are struck by lightning receive a severe electrical shock and may be burned," said Marvin, "but they don't carry an electrical charge, so they can be safely handled. A person you may think killed by lightning could be only stunned or unconscious. Often he can be revived by immediate mouth-to-mouth resuscitation, supplemented by manual heart compression. In a group struck by lightning, those who seem dead should be treated first; those who exhibit vital signs will probably recover by themselves, though burns and other wounds may need treatment. Recovery from lightning strikes usually is total except for possible impairment or loss of sight or hearing."

"Tell me, Marvin, now that we've covered the safety rules, do only thunderstorms cause lightning?"

"No, Ralph, thunderclouds are only the most common producers of lightning. Actually, lightning also occurs in snowstorms, sandstorms, and in clouds above erupting volcanoes. It has even been reported to occur in clear air. You've heard of a 'bolt from the blue'?"

"If my memory serves correctly," said Ralph, frowning, "my saintly mother always used to tell me that's what would hit me if I persisted in my surly, rotten ways. I don't think I want to hear about lightning anymore. Why don't you tell me about flash floods?"

Flash Floods

"Ah," said Marvin, "flash floods. Flash floods are masters in the element of surprise, my most favorite dramatic quality. They rise and fall with almost no advance warning, and you must be a sharp piggy not to get caught unawares. Say, for instance, that you are camping in a dry creek bed, and you see a storm in the distance, but the sky overhead is clear."

"I often rest in dry creek beds after rooting for truffles," said Ralph, worriedly.

"Well, you probably shouldn't do that. You see, the sky could be blue above your head, but a storm miles away could swell the creek at a higher point, and you wouldn't know you were in the way of the runoff until you heard the water roaring towards you." Marvin paused. "So you should make it your business to take care of yourself, and to do that you should know these things:

1 You should know what a forecast river height means in terms of your own property.

2 You should know how far your property is above or below anticipated flood levels. If bad weather is expected, or it is annual flood season where you live, you should know before you camp out how far your campsite is above or below waterways near you.

3 You must know, in order to make any sense of 2, above, how this elevation relates to river gauges for which forecasts are prepared.

4 You should know the location of safe areas in case of flooding.

5 Always seek higher ground, staying out of known water paths such as dry creek or river beds.

6 You can get the above information on flood levels and land elevation relative to rivers and creeks from your local city government or from the State ranger."

"Tell me what a real flash flood is like!" said Ralph.

"Well," answered Marvin, "I know of one in 1970 that was the worst in Arizona history. It happened in the mountains of central Arizona on Saturday afternoon and evening of September 5, I believe. It rained more and harder in one day than ever before. Mountain streams and dry washes rose with rushing, violent waters. Twenty-three people died—all away from home. Fourteen of these victims had tried to flee campgrounds in the headwaters area of Tonto Creek. The Weather Service Officer had sent out releases, and had broadcast forecasts to alert people to the likelihood of flash floods over the weekend."

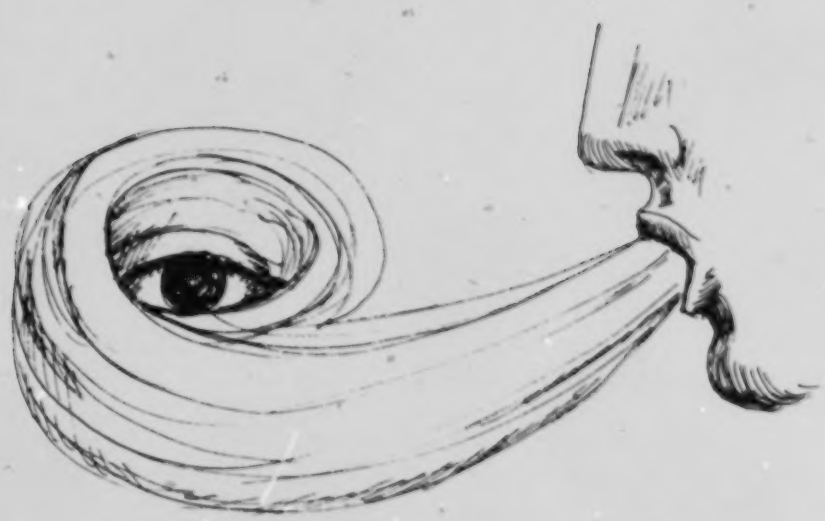
"Then why were so many people killed?" asked Ralph.

"I don't rightly know," said Marvin, "unless they didn't pay attention; but sometimes flash floods can arise within a couple of hours, such as from sudden and intense rainfall over a small area, or due to a dam failure or an ice jam. They are different in this way from your ordinary garden variety flood, which is usually more widespread in scope and may result, for instance, from melting snow in the mountains running off, or from a prolonged, heavy rainfall. You usually have a few days buildup for an ordinary flood, but flash floods arise often in a matter of a very few hours."

"Marvin," said Ralph worshipfully, "I really want to thank you for telling me all this. I feel much more able to cope now if a violent storm should occur."

"You're welcome," answered Marvin. "For your next lesson tomorrow, I'll teach you how helpful it is to get government pamphlets in your lunch."

"I wish you would," sighed Ralph. "They must be good for something besides eating—they don't taste very good at all."



A family of four Zorks (Zorks never produce more than two offspring) decided it was a good time for a vacation. Mr. Zork had earned two weeks off from work and the two little Zorks were out of school for the summer vacation. It was August.

"Where should we go?" asked Mrs. Zork. The Zorks believed in democracy, so the topic was open for discussion.

"The Grand Canyon!"

"China!"

"Yosemite!"

"Hold it!" shouted Mr. Zork. "Why don't we keep it sensible. Let's go where we can fish and swim and relax and play."

After some discussion of the topic, everyone voted to go to the coast. Mrs. Zork made a list of things to pack for the trip. After all, they would not have the conveniences of home for two weeks. Her list looked something like this:

Bottled water (Mrs. Zork was thrifty and kept plastic bottles)
Extra clothes
Canned food (all of their favorite kinds)
Can opener
Some fruit to munch on
Flashlight (and extra batteries)
Matches and candles
Tea and cakes
Radio with extra batteries (so they could listen to music. Zorks love music)
Things to do (cards, books, games and so on)

With everything packed, and the car filled with gasoline, the Zorks were off. It took about 7 hours to get to the coast from their house, so they left early in the morning, when it was still dark. After about 5 hours of driving, a startling announcement came on the radio; the U.S. Weather Service's information-collecting instruments had located a storm brewing in the Gulf.

"Stay tuned for further information on Hurricane Zelda."

The youngest, most curious Zork asked his father, "Who is Hurricane Zelda?" Mr. Zork read a lot, and so he answered, in the curious clipped manner of a Zork:

"A hurricane is a cyclonic wind, moving at a speed of 74 miles per hour or more. Its center, or eye, with a diameter of from 7 to 20 miles, is a spiral of low pressure, a place of calm, where winds blow lazily and skies are clear. Around this core, the air moves at terrifying speeds of up to 200 miles an hour. The earth's spin sets hurricanes in the northern hemisphere whirling in a counterclockwise direction; and in the southern hemisphere, in a clockwise direction. Heavy rains accompany the winds. We give them names of women because old prejudices die hard, I guess."

"Where do they come from?" asked the other little Zork.

Beware of that temporary calm. On the other side of that eye is the second half of the storm. Coming from the opposite direction, it hits without warning; it does not build in intensity as the critical onslaught did. So, "don't count your calms before they storm."

"Hurricanes need vast stretches of ocean, heated to at least 82° F., as a breeding ground. The hot, humid air is forced into a spiraling motion by a wind disturbance; the rising hot air sucks in more air, which, cooling as it rises, gives off great energy. This increases the speed of the upward-rising mass, more air is sucked in, more condensation occurs, releasing still more energy. Feeding upon itself, and upon the ocean, the young hurricane is picked up by a wind force, and is on its way."

"Where and when do hurricanes occur?"

"Hurricanes have predictable targets. Born in the warm seas of the Caribbean, the Gulf of Mexico, the tropic and sub-tropic North Atlantic Ocean, they favor latitudes around the equator, and strike at the western shores of the North Atlantic, the shores around the North and South Pacific, the eastern seaboard of the United States, and at the rim of the Indian Oceans. They don't often swing far inland."

Mr. Zork added, "I remember in 1955, Hurricane Diane killed 184 people and destroyed $500 million worth of property. Hurricane Audrey in 1957 killed 4,000 people."

"Wow," shouted the youngest Zork, "that sounds like a lot."

In 1570 a Mongol emperor sent an invasion fleet to conquer Japan, which seemed an easy task because the Japanese were vastly outnumbered. But just before the emperor's ships reached Japan, cyclonic winds came and wrecked them. The Japanese believed the gods had sent the storm to save them and called them "kamikaze," which means "divine wind." (During World War II they named their suicide planes kamikazes, hoping these desperate sacrifices might save them as the great wind once did.)

Mr. Zork continued, "It's an ill wind that blows nobody good." Hurricanes are indeed ill winds. Their power is sobering. Taking in and converting to energy a quarter of a million tons of water every second, the average hurricane generates a force equal to 500,000 atom bombs of the Nagasaki type.

"Compared with the 10 million tons of water a major nuclear explosion is capable of lifting into the sky, consider that a recorded hurricane over Puerto Rico dumped 2½ *billion* tons of water in a few hours—and that was only a fraction of its total outpouring.

"We breathe sighs of relief," Mr. Zork continued, "when some of the 40-odd hurricanes which form in a year swing polewards and dissipate over the cool water in their paths. But what of the hurricane that is not deflected from the land? Water is a hurricane's most destructive force; and the simplest, perhaps the likeliest thing it can do is drown you. In New England in 1635, the tide rose 14 feet at Narragansett and drowned eight Indians fleeing their wigwams. In 1737, a hurricane—or 'cyclone' as it's known there—hurled a 40-foot wave across the Bay of Bengal, destroying 20,000

boats, and leaving 250,000 people drowned. The Galveston, Texas, hurricane of 1900 drowned 6,000 people. Whether 250,000, or 6,000, if you're in its way, it may get you.

"The deadly wind and water don't stop at drowning people and animals. They can pick up buildings, boats, and cars and set them down miles away, make a deadly spear of a tree branch or a battering ram of floating timber. They can undermine highways, sweep away bridges, tear up railroad tracks, and wipe out crops."

As the discussion of hurricanes went on, the smallest Zork began to shiver. "M-m-maybe we should turn around and go the other way," he whimpered. Just then the radio broadcast a warning that Hurricane Zelda was following its predicted path, and that people should prepare for her to reach the coast by late the following afternoon.

"I wish we'd gone to Disneyland," said the littlest Zork.

"Don't carp," said his mother. "Let's thank goodness for technology. What if we had no radio to hear the news? At least now we can turn back in time. At home we'll be safe from the hurricane."

Mr. Zork contemplated aloud, "We *are* partially prepared now for disaster. We have provisions to last a week or so; but we don't have shelter; a car is very poor protection in a hurricane. We did secure our house before we left; and I put away the garden furniture and toys."

"I suppose if we lived in hurricane country we would need a plan," added Mrs. Zork.

"Yes, like the ones the civil defense agency sends us in the mail."

The Zorks spent the trip home playing the game of "what if?" They thought up some rules for coping with the possibility of hurricanes; Zorks being sensible, the rules are, too. Here they are:

Food and Emergency Items

Have an adequate supply of food and emergency equipment on hand at all times; at the first hint of an impending hurricane, check supplies. You should have:
Enough canned food to last 4 or 5 days; and a can opener.
Emergency light and cooking equipment; fuel to keep them running.
Batteries for the radio. Don't be cut off from the source of information.
Dry ice (not essential) to keep things cold if the power is cut off.
Matches and candles or kerosene lamps.

Water

Drinking water is of prime importance. You need enough for the duration of the hurricane, perhaps 2 or 3 days, plus a sufficient amount to cover any subsequent shortage due to broken water mains or contamination. Fill the bathtub and any other usable containers (plastic bottles, etc.) with drinking water. Having checked the minimum essential supplies necessary to keep you alive and well during the hurricane, set about making your home and surroundings safe.

Safety Precautions

Remember that the most harmless object left lying around in a hurricane can become a deadly weapon in the grip of the wind. Put away children's toys and garden furniture. Secure the garbage can and the lid. Board windows, making sure to keep them a little ajar in order to equalize pressure. Otherwise they might explode as a result of the enormous suction power of the hurricane.

Empty the swimming pool if you have time, otherwise you may find it dumped in your living room. Make sure the car is full of gas, in case you have to evacuate, but put it away safely from the storm.

If you live in a mobile home, lash it down securely with cables and anchors. Anchoring should be on a permanent basis. You can get the details by requesting DCPA Technical Report TR-75, "Protecting Mobile Homes from High Winds."

Lash your boat securely. Or, as they do in the Bahamas in a hurricane, remove the engine and temporarily sink the boat. Securely moored, it's very safe under the water.

Final Safety Precautions

Before the hurricane strikes, turn off water and follow utility advice on what to do about service lines. This way you can use water already in the pipes without fear of contamination. Board up the doors. Go to more secure shelter if so advised.

Comfort

Make sure you have something to help you through the anxious hours ahead. Fill thermos flasks with tea or coffee. Have things to do: read, play cards, knit. Keep a log; this will be a confined situation, and you will be bored before it's over. Once the hurricane is upon you, stay indoors.

Keeping in Touch

Radio stations have a superb record of staying on the air during a hurricane. If you've done your part by making sure you have a battery-operated radio, and the batteries to run it, you will know how the storm is progressing; pay attention to the radio bulletins; if it is advised that you leave your area, leave as directed, and go where you're told to go. Otherwise, sit tight, listen, and follow instructions. Then you'll know when the storm is over, and the danger past.

Terms

Small-craft warning: When a hurricane moves within a few hundred miles of the coast, advisories warn small-craft operators to take precautions.

Gale warning: Winds of 38-55 m.p.h. (33-48 knots) are expected.

Storm warning: Winds of 55-74 m.p.h. (48-64 knots) are expected.

FLOODS

Meanwhile, back on the Person's farm, Marvin the pig began to educate his good friend Ralph the pig on the subject of floods:

"I suppose when most people think of floods," said Marvin, "they envision dams breaking, rivers rising, heavy rains swelling lakes and streams.

"I picture something quite different. A couple of years ago I met "Boom-Boom," a rosy-cheeked child of about 2½ years. She was dressed in a pink-checked dress, and smiled a secret smile. She was very quiet and seemed to have developed that quality all mothers hope for in their children; she had learned to keep busy without having to cop all the adult attention.

"Boom-Boom's mother brought her over one afternoon, and the smiling one disappeared for something like an hour before we wondered idly where she was.

"We found out soon enough.

"She had been busily turning on faucets and plugging up drains.

"When I think of a flood, I always picture opening the bathroom door that afternoon, and Boom-Boom's smiling face as we were washed down the stairs."

Marvin then continued: "Community preparedness is a crucial factor in dealing with floods. Perhaps we should establish a task force to keep a close watch on smiling children, but I suspect that isn't what the authorities have in mind when they talk about preparedness. Whether the flood happens every season and the community expects it, or if it's a sudden flash flood, an adequate warning and evacuation system is essential. If you live in a flood area, heed warnings, and be prepared to move out fast if you have to.

"People have become recently more aware and appreciative of the value of plant life in preventing floods and saving the soil," Marvin went on. "Plant life acts as a sponge to soak up water. People used to go around stripping trees and foliage off the land, and then were surprised when floods eroded the bare soil. Now that we know trees and plants help to prevent certain kinds of floods, and help hold the soil in place, we can save ourselves some agony by making sure that industries and private landowners don't go around pulling up trees and foliage indiscriminately.

"But floods happen anyway," he continued. "Mountain snows slowly melt and trickle down until the water level rises above the river banks. A fierce, dense rain can produce flood levels in a very few hours. That's why everyone should know what a *forecast river height* means: How far is your property above or below anticipated flood levels? How far is it from the flood water?

"Where are the safe areas? Some communities have flood mapping programs: this means that information on safe areas is available to you. If your community doesn't have such a program, you might want to organize one."

Marvin then rummaged around in the trough, and came up with the following list of precautions:

Before a Flood Happens

1 Always keep fuel in your car. If electric power is cut off, gasoline pumps may not operate.

2 Stockpile enough food and water to keep you and your family and pets for 3 or 4 days at least. Store food that doesn't need to be cooked, and a can opener.

3 Keep a battery-operated radio so you'll know what's happening, a flashlight with extra batteries, matches, blankets, and candles.

4 Keep a first aid kit.

All these things are necessary in case you have to evacuate.

When You Receive a Flood Warning

1 If you're told officially to evacuate, follow the directions.

2 If you don't have to evacuate, fill available containers with water, including the bathtub. Water supplies often are contaminated by floods, so you may have to rely on what you have on hand. You can use water in toilet tanks in emergencies. Shut off water at the mains before flood waters rise so that contaminated water won't back up into your supply.

3 Dry ice will keep your refrigerator and freezer cold if there is no electricity. If you don't open your freezer or refrigerator *at all*, the food inside will be safe for a minimum of 2 days.

4 Books, games, cards or anything to keep everyone from sitting and staring at one another for several days are all nice to have.

During the Flood

1 Stay indoors. If you must go out, or find yourself trapped outside, go to high ground.

2 Don't drive over flooded roads, especially where they cross overflowing streams and rivers. Currents are often strong, and cars and people get swept away.

After the Flood

1 Don't use water or foods which have come in contact with flood waters. They could be contaminated.

2 Unless officially advised that water supplies are safe, boil water until the supply has been tested. To be safe, bring water to a rolling boil for 10-15 minutes.

3 If you need medical aid, food, shelter or clothes, go to the nearest Red Cross station.

4 Don't go to disaster areas unless you have some real help to offer. Sightseers are like the rest of the debris—they're in the way and have to be moved.

5 Use your head in unfamiliar situations. Don't look for gas leaks with a lighted match; gas explodes. Don't handle wet electrical equipment; you could get electrocuted. Don't use the telephone unless you have a genuine emergency to report. The lines will be needed for emergency traffic.

6 Try to clear away mud and wreckage around your home and areas close to you. Maybe you can offer some shelter, comfort, or food to those in worse shape than you are.

After digesting all that, Ralph was feeling a little hungry. He generally felt a little hungry—but Marvin wouldn't let him start rooting around until he fed him a little more kernels of information concerning floods.

"How else are you going to grow up smart, and go to market?" asked Marvin.

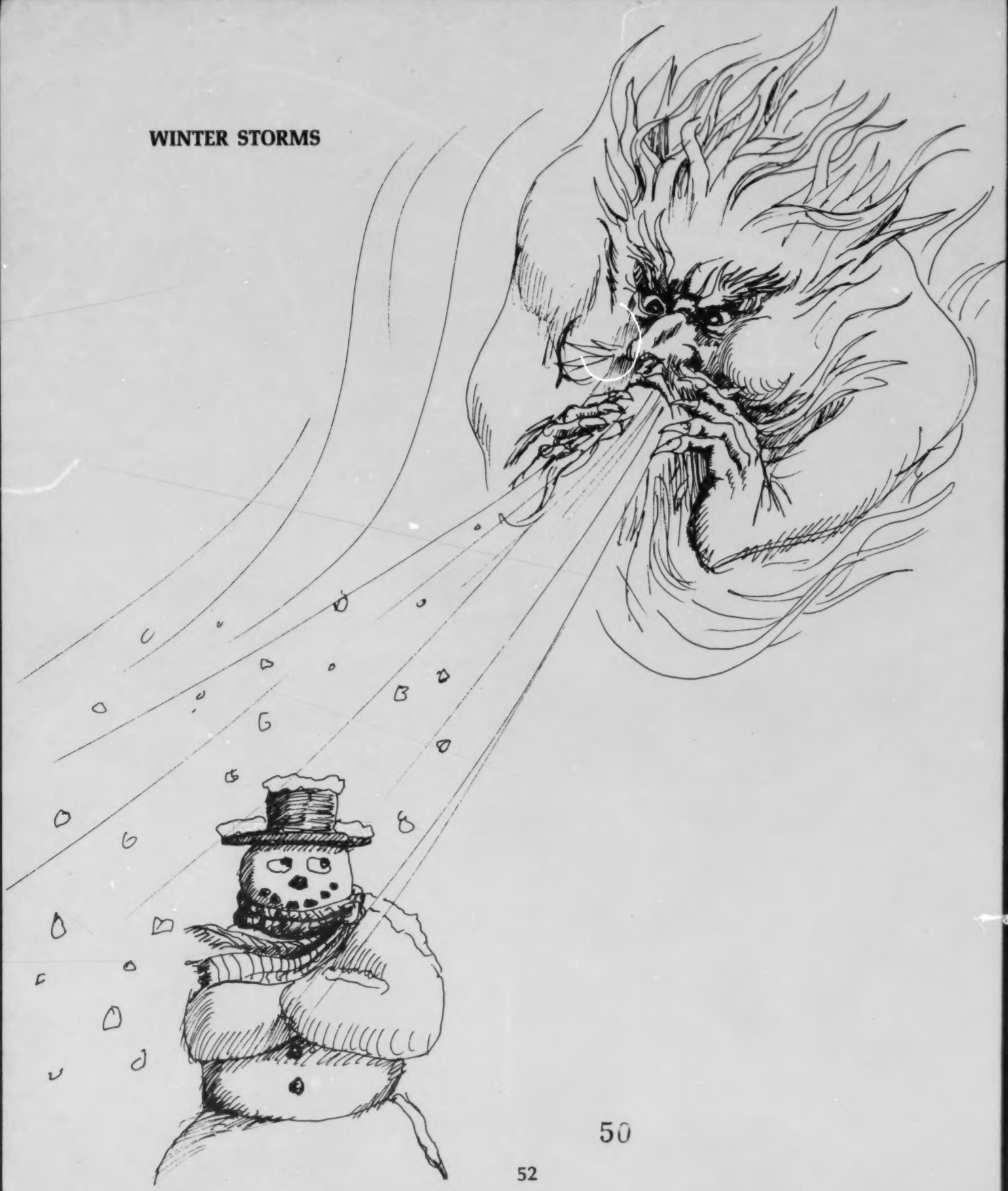
"A flood can happen anywhere," Marvin reminded Ralph, "but there are some areas of the United States which are flooded almost every year, at about the same dates. And there are other places with a continuing flood potential, as when a community is built below a dam. If you live in an area where the possibility of flooding exists, you can find out whether or not you are protected. Are there dam codes? Are they adequate? Are they complied with? Does your community have an adequate flood warning system?

"Sometimes it's hard to find out," Marvin continued, "whether gaps exist in any program of protection. But many programs have vocal, often political, critics. Check out the details at the City Hall. Begin with the local civil defense office.

"One often hears that a tragedy 'never should have happened'," Marvin noted sadly. "Translated, that means human ignorance and human apathy were at least as much to blame as natural forces. Then again, human apathy and ignorance may be natural forces too."

Ralph shivered a little when the thunder rumbled, but each time he looked at Marvin and remembered all the comforting facts he had just heard. He grunted, took a nice, leisurely roll in the mud, and snuffled up some more corn. A pig's life is not a bad one, he decided, yawning contentedly—especially when the farm is on nice high ground!

WINTER STORMS



Sanderella: A Feary Tale

A long time ago in a land of snow and ice there lived a young woman named Sanderella. Sanderella's mother and father died and she was homeless and penniless, so it was arranged that she was to go live with her nasty stepmother and her two steppy uglisters. They had hearts as cold as a *blizzard*, which is a storm defined by the U.S. Weather Service as having winds of at least 32 m.p.h., temperatures well below freezing, and visibilities reduced by snow to 500 ft. or less.

Sanderella was treated like a slave, and forced to do the bidding of her wealthy step-relations. She cooked and cleaned, swept and sewed, etc., etc.

One day Sanderella came upstairs from her dingy basement quarters to find the house in a state of excitement. An invitation had been received from the Royal Palace. The two uglisters were chattering gleefully.

"A masked ball! Just think of it," cried Flora, the elder. "Whatever shall I wear?"

"Whatever you wear you would still be a fright," answered Flossie, the younger, sweetly. "The only important question is, how should I wear my hair?"

Sandy approached the uglisters hesitantly. "May I go too?" she stammered.

Flora and Flossie whined on poor Sanderella like snow squalls. *Snow squalls* are brief, intense falls of snow and are comparable to summer rain showers. They are accompanied by gusty surface winds.

"Just who do you think you are, you poor, mousie scullery maid, to embarrass this house by going to a Royal ball? You must be dreaming," sniffed Flossie.

"You are going to spend all your time between now and the day of the ball fixing our hair and sewing new gowns for us," added Flora.

But the nasties were wrong. For a winter storm was gathering over the land. Because Sanderella was good and pure, she was assigned a godmother with a meteorology degree, and this godmother dropped in on Sanderella a few days later, as Sanderella was hemming a bow for Flora's dress.

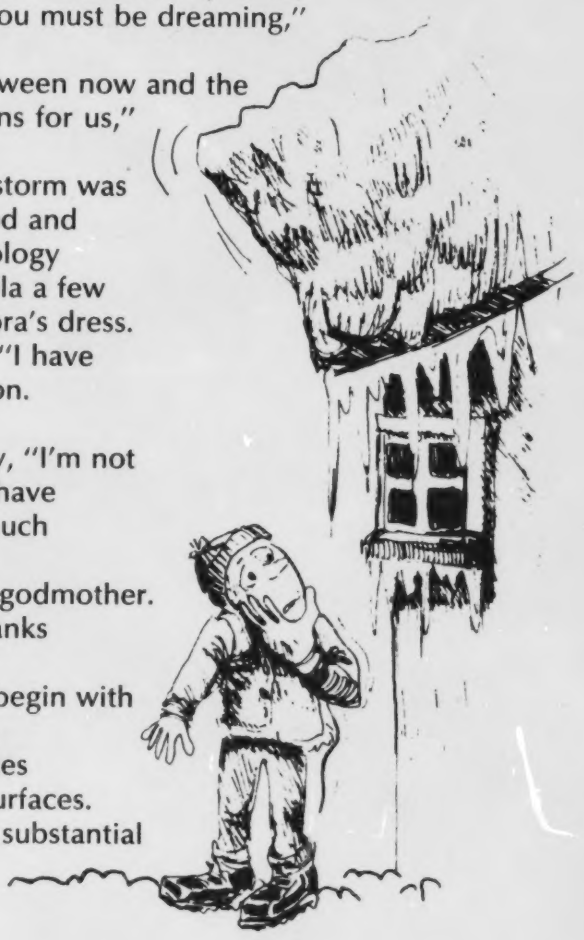
"Sanderella," said her godmother sweetly, "I have news for you. There is to be a winter storm here soon. Guess what kind it is to be."

"Listen, Godmother," said Sanderella testily, "I'm not ready to play quiz games with you this afternoon. I have to finish this dress, and besides, I don't know that much about winter storms."

"Are you interested in learning?" asked the godmother.

"Not in the least," said Sanderella, "but thanks anyway."

"Excellent," said the godmother, "We will begin with *freezing rain*. Freezing rain is rain which occurs when temperatures are below freezing. The moisture freezes on impact, causing a coating of ice on all exposed surfaces. Freezing rain or drizzle is called an *ice storm* when a substantial



glaze layer accumulates. (In some parts of the country, ice storms are called "silver thaws.")

"*Sleet* is frozen rain drops (ice pellets) which bounce on surface impact. Sleet does not stick to objects, but in sufficient depth can cause dangerous driving conditions.

"The U.S. Weather Service issues *heavy snow warnings* in areas where a large accumulation is expected. This term usually is used in a forecast when a fall of 4 inches or more is expected in a 12-hour period, or when a fall of 6 inches or more is expected in a 24-hour period.

"*Blowing* and *drifting snow* generally occur together and result from strong winds and falling snow or loose snow on the ground. *Drifting snow* is a term used in forecasts to warn that strong winds will blow falling or loose snow into sizeable drifts. In the Northern Plains, the combination of blowing and drifting snow, after a large snowfall has ended, is often called a *ground blizzard*."

"A cold wave warning indicates an expected rapid fall in temperature within a 24-hour period which will require special protection for agricultural, industrial, commercial, and social activities. This warning is an alert to the public that an expected cold wave will require greater than normal protection measures."

"Something people often don't realize, Sandy," said the godmother, "is that a very strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower, combined with a calm atmosphere. For instance, if the temperature outside is 20° F., and the air is calm, the *wind chill factor* is nothing; but if the temperature is 20° F., and the wind is blowing at 30 m.p.h., the effect on your body is the same as if the temperature were minus 18° F. A strong wind can make any temperature 'chilling'."

"Why are you telling me all this, Godmother?" asked Sanderella.

"Because, my dear, you have enormous feet, so I think you will have to make an impression on the Prince another way. Now listen carefully."

Winter Storm Safety Rules

"There is to be a blizzard the night of the ball. Make yourself a nice little dress and go to the ball. I will tell you how to save the kingdom from the blizzard:

1 Listen to and heed the latest Weather Service warnings and bulletins on radio and television.

2 Check battery-powered equipment, emergency cooking facilities, and flashlights before the storm arrives so you won't be without heat or light.

3 Check your supply of heating fuel, because fuel carriers may not be able to move if the storm buries your area in snow.

4 Stock an extra food supply. Include food that needs no cooking or cooling in case of power failure. The food in your freezer and refrigerator is safe from spoilage for a minimum of 2 days if you don't open your refrigerator or freezer at all.

5 Prevent fire hazards by preventing your stove, heater or furnace from overheating. Don't leave a fireplace unattended.

6 Stay indoors during cold snaps and storms unless you are in top physical condition. If you must go out, don't over-exert. Particularly, don't kill yourself shoveling snow. If you're out of shape, it can bring on a heart attack, a comon cause of death during and after winter storms.

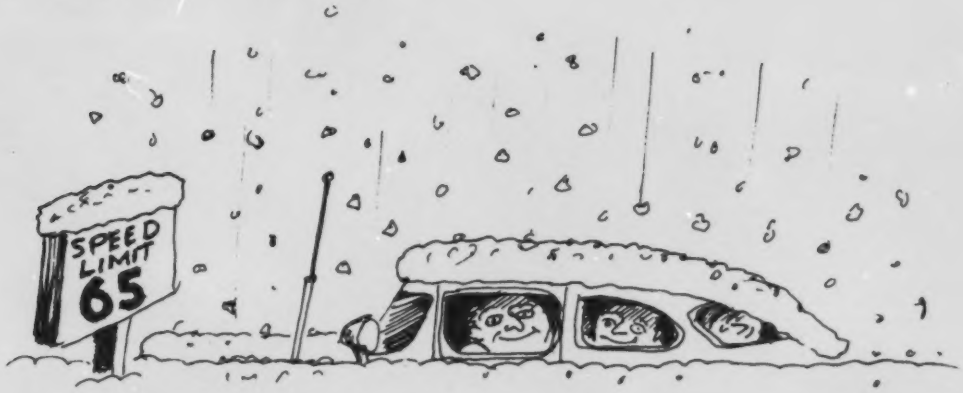
7 If outdoors, dress in loose-fitting, lightweight, warm clothes in several layers, because you can remove layers to prevent perspiring and subsequent chill, and layers trap warm air close to your body. Outer clothes should be tightly woven, water-repellant, and hooded. Cover your mouth to ensure warm breathing and to protect your lungs from extreme cold.

8 Get your family's car winterized before the storm season. Keep water out of the fuel by keeping the tank filled.

If You Must Travel Any Distance By Car

1 Have your family take care of everything on this checklist *before* you leave:

ignition system
battery
lights
snow tires installed
cooling system
fuel system
lubrication
exhaust system
extra gas in portable safety can
heater
brakes
wiper blades
defroster
tire chains and tow chains
antifreeze
winter-grade oil
flares



2 If the storm tests your limits, seek refuge immediately.

3 Select alternate routes to travel in case your preferred route isn't passable.

4 Listen to and heed latest weather information.

5 Try not to travel alone; two or three people are better because they can help one another. Travel with another car if you can.

6 Always fill your gas tank before entering open country, even for a short distance. You are less likely that way to run out of gas and be stranded, or to be unable to heat your car by running the motor if you are stranded.

7 Drive defensively.

8 Carry a winter-storm car kit: Blankets or sleeping bags to keep you warm, matches and candles for light, an empty 1-lb. coffee can with plastic cover to use as a toilet, facial tissue and paper towels, extra clothes, high-calorie nonperishable food, a compass and road maps, a knife, first aid kit, shovel, sack of sand in case you get stuck, flashlight or signal light, a windshield scraper, booster cables, two tow chains, a fire extinguisher, a catalytic heater, and an axe.

If a Blizzard Traps You

1 Avoid overexertion and exposure. Strenuous acts like pushing your car, shoveling snow, and so on can cause a heart attack in extreme weather conditions.

2 Stay in your car. Disorientation happens fast in blowing snow, and you are sheltered and more likely to be found in your car.

3 Don't panic.

4 Keep fresh air in your car. Freezing wet and wind-driven snow can seal the passenger compartment and suffocate you. Keep the *downwind* window open, when you run the motor and the heater.

5 To avoid freezing, exercise by clapping hands and moving arms and legs vigorously from time to time. Don't stay long in one position.

6 Turn on dome light at night to make the car visible.

7 Keep watch. Don't allow all the people in the car to sleep at once, or all of you may freeze to death.

Rural Residents—How To Protect Livestock

Large numbers of livestock are killed in blizzards. For humane and also economic reasons, stockmen should:

1 Move livestock, especially the young, into sheltered areas. Shelter belts, properly oriented and laid out, are better protection for range cattle than shed-type shelters, which may cause cattle to overcrowd, with consequent overheating and respiratory disorders.

2 Haul extra feed to feeding areas before the storm arrives. Length of storm is the greatest determinant of livestock loss; if the storm lasts over 48 hours, emergency feed methods are required.

3 Autopsies of cattle killed by winter storms show the cause of death to be dehydration, not cold or suffocation. Because cattle cannot lick enough snow to quench their thirst, stockmen should use heaters in water tanks to provide livestock with water and feed after long exposure to winter storm conditions.

"Now, Godmother," sighed Sanderella, "I know why you are telling me all this, but do I have to *remember* all of it?"

"Silly girl," answered the godmother, "It should be plain to you by now, that by paying attention, and *learning*, you'll be able to escape your obnoxious situation at home. Make preparations for the storm now, and you will save the kingdom. On your

way to the ball, your winter-storm car kit will save the Prince, whom you will find on the road in a stalled car. Your other preparations will save the kingdom from freezing and starvation."

"Godmother," said Sanderella, "how am I to know you're for real?"

Godmother ignored the remark, and went on with her feary tale:

"Sanderella," she said, "the unprepared don't do well in a winter storm. In 1966, blizzards hit from New England to Virginia, and the cold extended southward all the way to central Georgia. The storm caused more than 50 deaths and marooned thousands of people."

"The great Chicago storm of 1967 snarled the entire city for days. No transportation was available, and the snow deepened so quickly, commuters were stuck all along the roads. Thousands abandoned their cars and took shelter anywhere they could. People were trapped all over the city. Many couldn't make it home for two days or longer. More than 45 deaths were attributed to the storm. Oh, it was a mess."

"Okay," said Sandy, "I see the point. I will do exactly as you say."

For days, Sanderella made careful preparation for the storm, checking equipment and gathering materials. The night of the ball, Sanderella got dressed, and as she prepared to leave the house, Flora and Flossie appeared. "Where do you think you're going?" they shrieked.

"To the ball," answered Sandy, "and unless you know winter storm survival rules, I'd stay home if I were you."

Of course they didn't listen to her, but set out on foot for the royal palace, and were never seen again.

Sanderella climbed into her car; and, driving carefully, happened upon the Prince in his marooned auto. She knew right away that he was her Prince, because he looked marooned, just like the godmother had said he would.

"Here I am," said Sanderella.

"And who are you?" asked the Prince.

"I have come to save you with my winter-storm car kit," answered Sanderella, "and your whole kingdom from destruction by the storm."

So the Prince married Sanderella, who then went about the kingdom dispensing tedious lectures on winter storms.

EARTHQUAKES AND TIDAL WAVES

In a social science class one day, a boy named Harvey sat thinking wretched thoughts. In the midst of his reverie, he heard a dull roar. Then a sharp thud. The room creaked and groaned. The floor rolled like a ship's deck. Books fell from the walls, and the lights went out. When Harvey and his desk slid out the door into the hall, he decided from his new perspective that the fates were punishing him for his uncharitable daydreams. Harvey quickly made one of those desperate bargains people make in time of crisis. "If I am spared," he promised, "I will devote my whole life to good deeds."

Harvey lived. Two days later he punched his little sister in the stomach and stole her piggy bank. Clearly, it is not enough to make promises during an earthquake. Instead:

During the Shaking:

1. Try to stay cool and take in what's happening. An earthquake is really a marvel, unless you're standing under a tottering wall. The roaring and rolling can be very terrifying, but unless something falls on you, it probably won't hurt you. The earth does not swallow whole neighborhoods and close up again.
2. If you're indoors, stay there. Get under a heavy table or desk to protect yourself from falling debris; or move into a doorway or against inside walls. A door frame or the structural frame of the building are its strongest points, and least likely to collapse on your head. Stay away from glass; the rocking motion can shatter it.
3. If you're outside when the shaking starts, get away from buildings and electrical wires. Stay in the open. Falling debris can kill you.
4. What if you're in a moving car? Don't stop on or underneath a bridge or overpass. Don't stop where buildings can come crashing down on you. If in the open, pull off the road, stop the car, and stay inside until the shocks stop.

Immediately After an Earthquake:

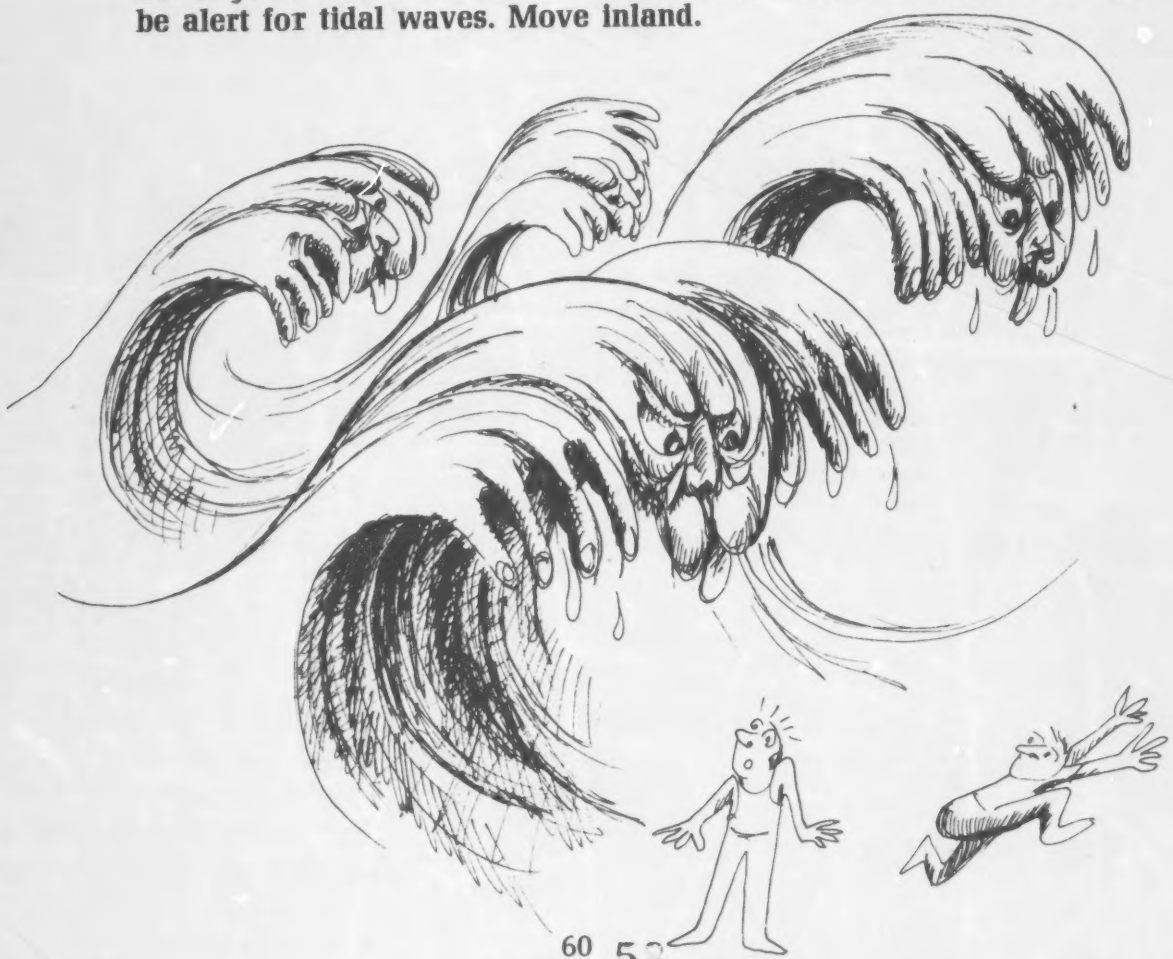
1. Earth movement can break water, gas, and electrical lines. If there is a gas line into your home or building, turn off burners—including pilot lights. Don't light candles, matches, or lighters until you're sure there are no gas leaks. If you smell gas, open the windows. Leave the house or building and report the leak to the fire department. A gas leak can cause an explosion. Stay out of the building until the leak is fixed.
2. Turn on your radio or television to get official emergency information and instructions.
3. Don't use the telephone unless you have a real emergency to report. Don't tie up lines that are urgently needed for emergency operations.
4. Stay out of damaged buildings. Aftershocks can cause sudden collapse.
5. Don't go sightseeing. The area probably will be cluttered enough, and you will hamper emergency work.

If You Live in a 'Quake-Prone Area:

1. Don't hang heavy objects on walls unless they are lashed securely.
2. Locate cut-off switches for gas, electricity, and water. (Check with your utility companies on what to do with these controls in an emergency.)
3. Stockpile enough food and water to keep you and your family and pets for at least 3 or 4 days. For each healthy adult, 2 quarts of water per day is the recommended minimum for 3 or 4 days. Beyond that short amount of time, if the climate is very hot, or if a person is extremely active, the amount of water necessary is greater. Store food that doesn't need cooking, and a can opener.
4. Keep a first aid kit handy, along with any medicines you may need.
5. Keep the gas tank of your car filled, so you can move to a safer area if necessary, following an earthquake.
6. Keep a battery-operated radio so you can receive emergency information and instructions. Also keep on hand a flashlight with extra batteries, and blankets.

Tidal Waves (Tsunamis)

1. Not all earthquakes cause tidal waves, or tsunamis, but many do. If you're near the ocean or tidal inlet following an earthquake, be alert for tidal waves. Move inland.



2. The earthquake may generate a series of higher-than-normal, fast-moving waves. Listen for tidal wave warnings, and stay out of danger areas until an "all-clear" is issued.
3. A warning means a tsunami is coming. The tsunami of May, 1960, killed 61 people in Hilo, Hawaii, who thought it was "just another false alarm."
4. Don't go down to the beach to watch for a tsunami. If you are close enough to see the wave coming, you probably are too close to escape.
5. Approaching tsunamis are sometimes heralded by a noticeable rise or fall of coastal water. This is nature's warning. Believe it.
6. During a tsunami emergency, your local emergency organizations will try to help save your life. Cooperate.
7. Sooner or later, tsunamis visit every coastline in the Pacific. Warnings can apply to you if you live in any Pacific coastal area.

Earthquake Stories

You sit down to dinner. As you lift your fork, the sudden tinkling of crystal causes you to look up. The chandelier is shaking. It is November 1, 1755, and you are in the United States. The shocks you feel are from an earthquake in Lisbon, Portugal.

You are feeding chickens on your small farm just outside New Madrid, Missouri. It's December 6, 1811, the middle of winter. Suddenly, you are knocked off your feet by the first in a series of shocks that will continue for nearly 2 months, with long stretches of quiet in between. The largest of these shocks is felt from the Gulf of Mexico to Canada, from the Atlantic Ocean to the Rocky Mountains. And when the whole thing is over, there is a new lake on the map: Reelfoot Lake in Tennessee, 20 miles long and 5 miles wide.

It is April 18, 1906; 700 people around you lie dead; the great San Francisco earthquake and fire has left the city a pile of rubble. Even greater in magnitude is the Great Alaskan Earthquake of Good Friday, March 27, 1964. It releases nearly twice as much energy. Ground motion near the epicenter is so violent tree tops are snapped off. People as far away as California are killed by tidal waves, and the shocks can be felt over 500,000 square miles.

What and Where Are Earthquakes

The earth's crust is constantly subjected to stresses from deep inside the earth. First the crust bends, and when the stress exceeds a certain limit, the crust breaks and "snaps" to a new position. In the process of breaking, vibrations are caused; they are called earthquakes. Some vibrations have a frequency high enough to be heard, other frequencies are quite low. These vibrations cause the entire planet to quiver or ring like a tuning fork.

A fault is a break in the earth's crust where two crustal blocks have parted company. One block may move right while the block facing it moves left, or one block may move up while the other moves down. Movement along California's San Andreas fault is mainly horizontal. This is called a "strike-slip" fault. A fault having vertical movement is called a "dip-slip" fault.

Earthquakes tend to recur along faults, which are zones of weakness in the earth's crust. Though earthquakes may strike any place, at any time, they tend to occur in the same general pattern—mainly in three broad zones.

The largest earthquake belt in the world, called the "ring of fire," borders the rim of the Pacific. Eighty-one per cent of the most violent earthquakes occur there. The belt extends from Chile, north along the South American coast, through Central America, Mexico, the west coast of the United States and the southern part of Alaska; through the Aleutian Islands to Japan, the Philippine Islands, New Guinea, the southwest Pacific Island groups and on to New Zealand. Peru, where the earthquake of May 1970 caused 72,000 deaths, is in this 'quake belt.

The Alpide, the second major earthquake belt, runs from Java through the Himalayas to Sumatra, through the Mediterranean and out into the Atlantic Ocean. The Iranian shock of 1968, which killed 11,000, occurred in this zone.

The third major belt is the mid-Atlantic. Earthquakes in these three zones are expected, but major 'quakes sometimes occur outside these areas.

Maybe Death Is Unnecessary

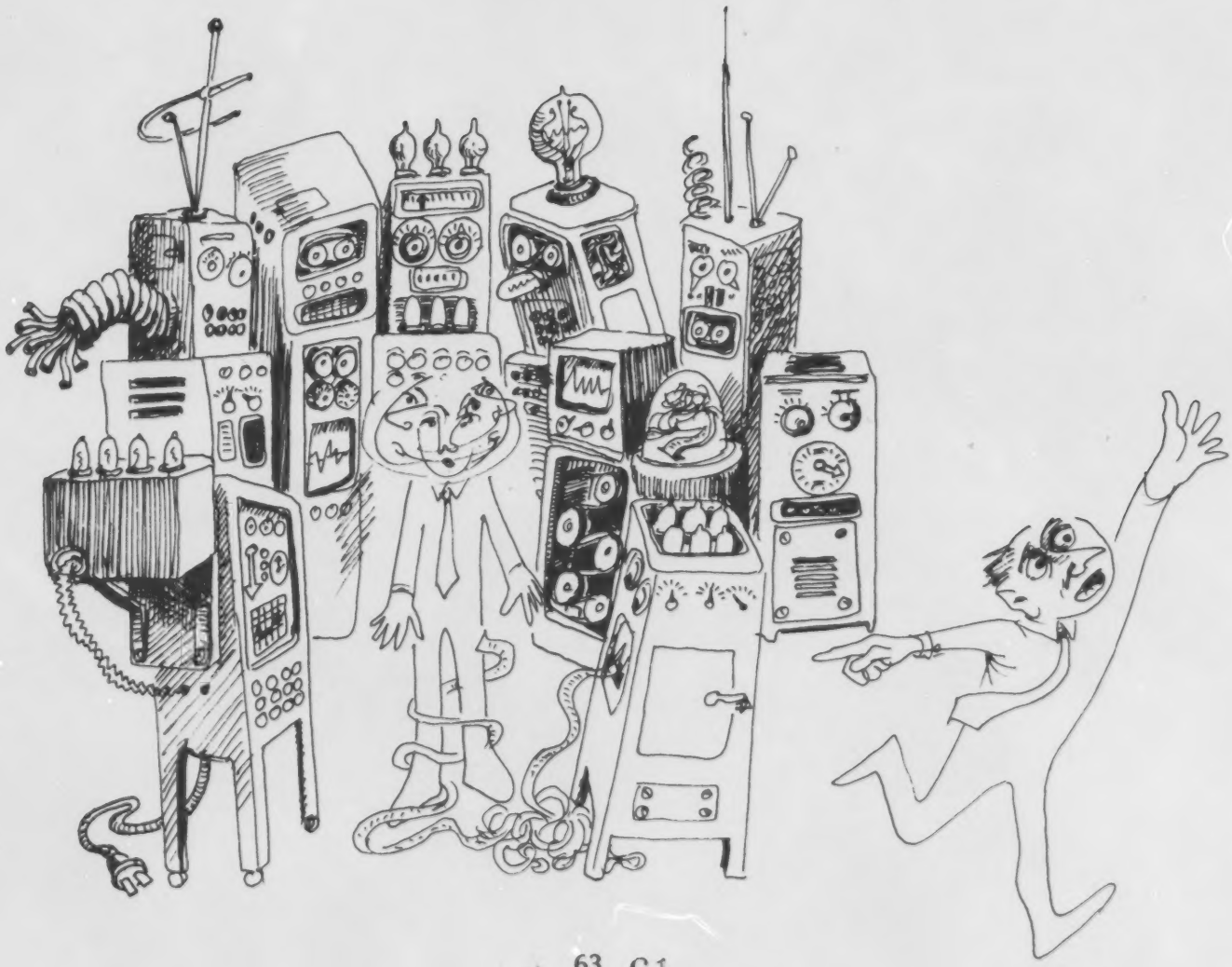
When Charles F. Richter, the widely respected earthquake expert, was asked in the summer of 1971, "What are the most interesting aspects of California earthquakes?" he replied, "The unnecessary death and destruction they cause."

Many experts feel that we have the technology to build "earthquake-proof" structures that will withstand the most powerful earthquakes, but the general consensus is that they "cost too much."

Death and human suffering cost a lot, too. People are usually unwilling to think about a danger they can't see, preferring to believe that destruction "won't happen here."

Americans who live along known faults in the earth's crust have building codes to protect them; but these codes are not always earthquake proof. Many schools do not come up to present-day structural safety requirements. The cost of making buildings safe is really a question of *when* to pay; before the quake, to prevent the disaster; or after it, to repair the damage.

TECHNOLOGICAL FAILURES AND EMERGENCIES



Structural Fires

Reginald lay on the sofa, tired out from the day's exertions. He'd been planning beans on toast for dinner, but somebody close by was having barbecued steak; a delicious smoky aroma was creeping up on him.

Suddenly his friend Huey burst into the room. "Hey man, don't just lie there, put it out."

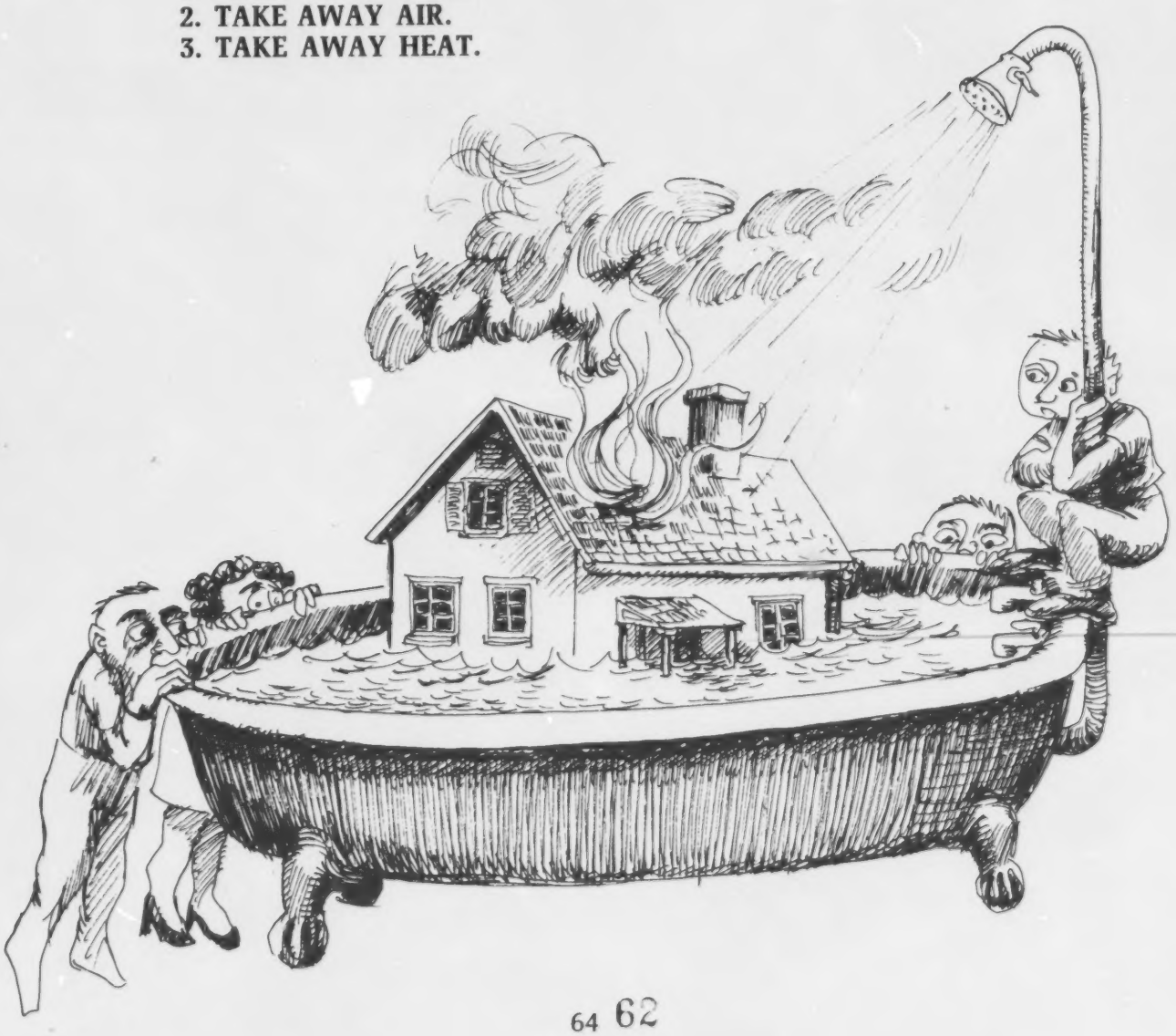
"Put what out?"

"The fire, man, the fire."

Sure enough, smoke came wisping out of the kitchen. Reggie leaped to his feet. "Huey, help me. What am I going to do?"

"There are three basic ways to put out a fire," said Huey cooly, as he removed the burning pot from the stove and dunked it in the sink:

1. **TAKE AWAY FUEL.**
2. **TAKE AWAY AIR.**
3. **TAKE AWAY HEAT.**



"If you aren't positive you can put it out at once, don't fool around. Call the fire department right away so the fire won't get a head start," continued Huey.

"What should I do after I call the fire department?" asked Reginald, feeling a little foolish. "Maybe I can help before they get here."

"Well," said Huey, "get the burning material out of the house if possible, or into a small contained area where there is water or where the burning matter can be held safely without spreading. A shower is ideal if there are no shower curtains. A tub or sink is good if there are no flammable materials close by, like curtains or wood. The tile in a shower or the porcelain in a bathtub won't burn, and there is water right there to quench the burning objects. Of course this won't work with certain kinds of fires."

"Like what?" asked Reginald.

"Like an ELECTRICAL FIRE, when you first have to shut off the electricity. Then you treat it as you would any other fire."

"Why the electrical shutoff?" asked Reginald.

"You can get a strong electrical shock if you mix water and electricity," answered Huey, "and I mean strong enough to kill you. If you can't shut off the electricity, don't use water. You could try to smother the fire with sand; or better yet, use a CO_2 fire extinguisher."

"Are there other kinds of fires where you shouldn't use water?" asked Reginald, busily opening windows, and coughing slightly.

"Well, an OIL or GREASE FIRE will spread if you pour water on it," said Huey. "That's because oil and water don't mix. You should try to shut off the supply of heat to the burning oil or grease and then smother the flames with dirt, sand, or heavy rugs and blankets."

"What about a gas fire?" asked Reginald.

"First thing, shut off burners if you can. Call the fire department. Get out of the house or building. Gas can cause explosions and more fires. If you have managed to cut off the gas flow at the burners, you can choose your method to fight remaining fire: water, sand or earth, wet blankets or rugs."

"What should I do if I wake up in a burning house?" asked Reginald fearfully.

"Get out of there as fast and as safely as you can," answered Huey. "Then call the fire department."

"What is the fastest, safest way to get out of a burning house?"

"Well," said Huey, "it depends. Jumping out of the window is just fine if you live on the ground floor; but it's not so bright if you live on the 14th floor. You should have an evacuation plan for your home and family now, before you need it. You should know escape routes from every room in your house and how to get out if one path is blocked by fire. For instance, if you're in an upstairs room and the stairway is blocked, how can you get out a window? Do you have a rope or ladder you can use to climb down? Can you knot sheets or clothing together to make a rope? Plan now. Always get downstairs as fast as you can. Upstairs is the most unsafe place to be. Heat and flames rise.

"If you are at home and you smell smoke or feel heat, remember: don't ever open a door without first feeling it. If it's hot, don't open it at all; the fire is probably just outside and will blast you in the face. Go out a window instead."

"If you must go through a smoke-filled room, or if you are trapped in one for awhile, remember the air closest to the floor is the freshest, for smoke rises. So cover your nose and mouth and crawl along close to the floor to avoid being overcome by smoke."

"What should I do if I'm somewhere like a crowded theatre and a fire occurs?" asked Reginald.

"Do your best to be calm, or at least reasonable," answered Huey. "More people are killed in a mass fire situation by being trampled or smothered by other people than by the flames."

"You know," said Reginald, "when I think of the Great Chicago Fire of 1871 I can't imagine that it was started by a cow kicking over a lantern in the barn."

"Oh," answered Huey, "there were a lot of things involved in the Chicago Fire. Before it started there had been a long drought in the Midwest. The temperatures were very high and the humidity was low. Besides, most of the buildings in Chicago in those da[illegible] were wood frame, and burned easily and quickly. You know, 300 people were killed and hundreds of buildings on 2,124 acres burned in that fire."

"I didn't know," said Reginald thoughtfully. "The poor cow never should have gotten all the blame."

Blackouts and Brownouts

"Fires are only part of the problem," said Huey practically. "What would you do in a blackout or a brownout?"

"A what or a what?" said Reginald. "I don't know what you're talking about."

"I will answer my question by telling you a story," said Huey. "There is a power grid serving a large population in the northeast section of the United States; let's call the grid "Charlotte." On November 9, 1965, Charlotte had a mechanical failure on one line and one switch, which produced an overload. Charlotte reacted to this by developing numbness in several fingers—some of which were lighting Manhattan. Most of Manhattan turned off like a big, tired firefly. Much of the city had no electricity at all. Refrigerators and radios, heaters and hair dryers fainted quietly away.

"In spite of how everyone talks about mass panic, no masses are known to have panicked. They lit candles in the dark, and played cards. People stuck in elevators told ghost stories and went to sleep.

"Part of the reason for the New York blackout was a lack of generation capacity. During the summer, unusually heavy demands are made on electricity sources, to keep things cool. To avoid overloading of lines so there isn't another blackout, the electric companies have reduced the voltage a number of times during recent summers to conserve power. This cutback of power is called a BROWNOUT. During a brownout, you can help prevent power failure by cutting back your own use of unnecessary equipment:

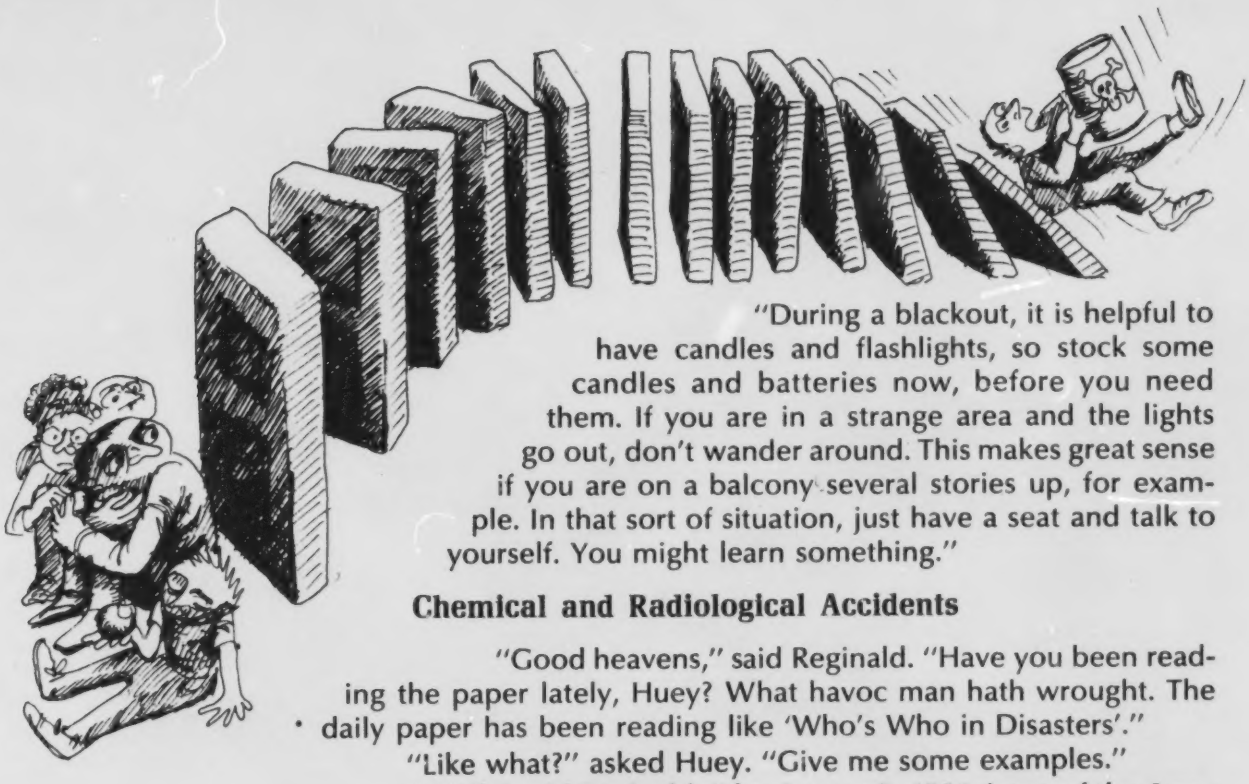
1 **Don't use electric "convenience objects" like the electric dishwasher, hair dryer, or motor equipment. Think of all the things using electricity that you don't really need. Make a list and see how many things you could live without.**

2 **Turn your air conditioner down or off.**

3 **Turn your refrigerator to the warmest safe setting. In an emergency, did you know you can unplug your refrigerator or freezer and it will keep food safely for a minimum of 2 days, if you leave it closed the entire time?**

4 **Turn out the lights when you leave a room, and don't use more lights in any room than you need.**

5 **Put lower-watt bulbs in your light fixtures.**



"During a blackout, it is helpful to have candles and flashlights, so stock some candles and batteries now, before you need them. If you are in a strange area and the lights go out, don't wander around. This makes great sense if you are on a balcony several stories up, for example. In that sort of situation, just have a seat and talk to yourself. You might learn something."

Chemical and Radiological Accidents

"Good heavens," said Reginald. "Have you been reading the paper lately, Huey? What havoc man hath wrought. The daily paper has been reading like 'Who's Who in Disasters'."

"Like what?" asked Huey. "Give me some examples."

"Well," said Reginald, "the August 3, 1964, issue of the *Journal of the American Medical Association* included an article entitled, "Parathion Residue Poisoning Among Orchard Workers." It seems that between 1959 and 1963, more than 275 cases of parathion poisoning were documented among workers harvesting citrus crops in California."

"What's parathion?" asked Huey.

"An extremely lethal insecticide," answered Reginald.

"That's really scary," shuddered Huey.

"And listen to these," said Reginald. "In the past year it has come to light that part of Grand Junction, Colorado, is built on radioactive material. Contractors apparently used tailings from uranium mines for land fill in constructing much of the town. It has now been discovered that these tailings are radioactive.

"In February of 1970, the tanker *Arrow* became impaled on a rock in Chedabucto Bay, Nova Scotia. It is estimated that 1.5 million gallons of heavy residual fuel oil spilled from the forward cargo holds. The oil that escaped polluted roughly 125 miles of shoreline. By February 14, over 2,000 seabirds had been killed. As the oil slick spread, the death toll rose."

"You know, Reggie," said Huey, "where there are people, there are accidents; no one can be blamed for the fact that human beings make mistakes. It's just that when someone does make an error of that kind, so many people and animals are killed as a result. It seems to me terribly important to somehow control all the deadly materials around us."

"Besides," said Huey, "it's not just that these lethal chemicals and gadgets and industries exist; they pose a constant threat of death and destruction. Just look at any week's collection of newspapers."

"What should you do about a chemical or radiological accident in your area?" asked Reginald.

"Well," said Huey, "there's not much you can do once some accident has happened; listen to the radio or television and follow the guidance of local officials."

"You know, Reginald, just 10 years ago few people were aware of how dangerous chemicals and radiation are. But recently more information has become available. It is important that people have a reasonable degree of knowledge about the hazards to which they may be exposed.

"Huey," said Reginald, "how can I find out what's happening, and what to do about it?"

"Well, the best place I know of to find out about all these things is your local health department, the environmental agency in your State, or even the Environmental Protection Agency in Washington, D.C. And the fact of the matter is," he continued, "that hazards go along with technological advances; if we are thoroughly informed of these hazards, we at least have the chance to make and implement reasonable decisions."

ENVIRONMENTAL POLLUTION

There is a little town in Pennsylvania called Donora. It was a busy industrial center back in 1948, when this story is set. About 14,000 people lived and worked there. One still day in October, fog and factory fumes combined to cover Donora with a thick smoggy blanket. After four red-eyed days, wind and rain arrived to scatter the black cloud. Almost 6,000 people had coughs, sore throats and breathing problems, smarting, watering eyes or nausea and vomiting. People with heart disease and bronchitis were crippled by the filth in the air; many had to be given emergency oxygen treatment. In the four days before the wind and rain came, 20 people died. This story is true.

In 1952, a fog hung over the city of London. That's not too unusual, because it's called the foggy city, but this particular fog combined with stagnant air and industrial pollutants to create a filthy blanket that hung over the city and stifled its inhabitants for five days. It seeped into houses, and people groped as though blind through the muggy blackness. At the end of the five days, 4,000 people were dead; many thousands more were sick. This story is true.

In New York in 1963, smog cloaked the city. It was different from previous smogs. This time the deaths of between 200 and 400 people could be traced directly to the foul air which lay over the city for that brief time. This story is true.

In a city called Berington, in 1980, stagnant air produced by lazy winds and high temperatures trapped concentrations of smoke, sulfur dioxide, carbon monoxide, small particles and other irritants beneath it. The city was like a pan and the air was like a lid sealing it shut. The pollutants and all the people were trapped beneath the layer of stagnant air. In the first two days many people with heart disease and respiratory problems and most older people died. In the next few days, many more old and sick people died, and those who were young and healthy became sicker and sicker.

Emergency oxygen ran out. Alarming numbers of young people began to develop asthma. The chronically ill had almost all succumbed, newborn babies were dying, and bronchitis was rampant. By the end of the week, the few who were still alive tried to get into their cars and leave the city. Many died in the attempt. When the smog finally lifted, rescuers said Berington looked like a ghost town. *This* story is *not* true. But it's not exactly a fairy tale either. The conditions which combine to produce such a disaster exist right now, here in America. The cleansing winds are still kind, so Berington hasn't happened. Yet.

Sobering Facts

United Press Report, Thursday, March 30, 1972: "The Environmental Protection Agency regional office said yesterday evidence indicates that the Mississippi River is so contaminated by industrial wastes that its water could cause cancer in humans....The EPA indicated the 60 industrial plants tested were contributing to the pollution although a few of them already had made some changes in their waste disposal systems."

"Wastes from industries discharging into the Mississippi River from the Baton Rouge area to below New Orleans have been analyzed and found to contain metals in concentrations which may endanger human health and the health of aquatic biota." Two cancer-producing compounds had been found in the water supplies of the Public Health Service hospital at Carville and the Carrollton plant at New Orleans.

"The EPA said the Mississippi River serves as the source of raw water for 1.5 million people along the 258 miles from St. Francisville, La., to Venice, La.

"Cyanides, phenols, arsenic, lead, cadmium, copper, chromium, mercury and zinc have been found in samples taken during the last 18 months."

EPA Environmental News bulletin. Due to noise pollution in certain industries, "...hearing loss looms as a major health hazard. Today it is estimated that up to 16,000,000 workers are threatened with hearing damage and that excessive noise costs industry about $2,000,000 each day in compensation claims, loss in worker efficiency, and reduced property values...."

In 1969, in *The New York Times*, Dr. Rene Dubos said that environmental pollution "...now affects the whole earth. Smog produced in urban and industrial areas is hovering over the countryside and beginning to spread over the oceans....

Cities will not benefit much longer from the cleansing effects of the winds for the simple reason that the wind itself is contaminated."

Industries discharge the greatest abundance of the most toxic pollutants into the waters of the United States, according to the Department of the Interior's Federal Water Quality Administration in its June, 1970, Status Report. In a 1969 report, *The Cost of Clean Water and Its Economic Impact*, the FWQA noted that 51 separate pollutants are now being discharged into U.S. waters from industrial processes. The list is partial rather than comprehensive."

We are *all* polluters. We all use cars and consume electricity and buy throwaway products in throwaway packages and produce waste in the water and in the air. Until the environment reflects your efforts to clean it, air pollution problems will remain with us, particularly in urban areas.

So, during heavy air pollution:

1 Cut down on physical activity, indoors and out. The more active you are, the more pollutants you take into your lungs.

2 Stay indoors as much as you can, and keep your windows closed.

3 Avoid smoke-filled rooms. Don't smoke.

4 Don't light fires in fireplace or incinerator.

5 Don't drive. If you must travel, use public transportation. That may seem inconvenient; but so will choking. If there is no public transportation available, and you MUST go somewhere, walk, bicycle, or form a car pool. Avoid busy streets and highways where you are likely to sit in your car, pouring exhaust into the air.

6 Cut down on water and electricity. Don't use nonessential electrical appliances, such as washing machines, dryers, and dishwashers, until the emergency is over.

7 Keep smog outside by drawing shades, keeping doors and windows closed.

8 Don't wear contact lenses; they irritate eyeballs when it's smoggy.

9 Postpone jobs that circulate dust indoors and out; sweeping, raking, beating rugs.

10 If a bus, truck, or car emits a cloud of fumes, hold your breath.

It is worth remembering that the public outcry has already proved powerful enough to make public and private officials begin to *talk* about cleaning up the environment. They realize they are dependent on you as a future voter and as a current consumer.

Each of us must set his own priorities. If a manufacturer pollutes the local waters, or if his product is "over-packaged" (it looks pretty but puts tons of plastic back into the environment), you must make up your own mind, as an individual, what you're willing to do about it.

No one wants to give up the entertaining, satisfying, and convenient goods and services our society produces. It's truly a question of priorities. Up to this time, our priorities have clearly been economic rather than humanistic. But we may have to modify our present pattern, or the problem will just continue to get worse and worse. Something must be done—and the first step is education. Each of us can re-educate himself; together we can re-educate our society. If we don't care enough, who does?

How To Fight Back

First find out what your local government is doing, or not doing, about the situation and what it can do.

It is possible to discuss the matter with the industry involved, or with your local environmental agency. But get your facts straight before you do it:

What is the location of the pollution? Be specific.

What is the nature of the pollution? (Try hard to find out; ask a chemist at the local university.)

Get a description of the pollutant, color, odor, form, and a general idea of how and where it was spreading.

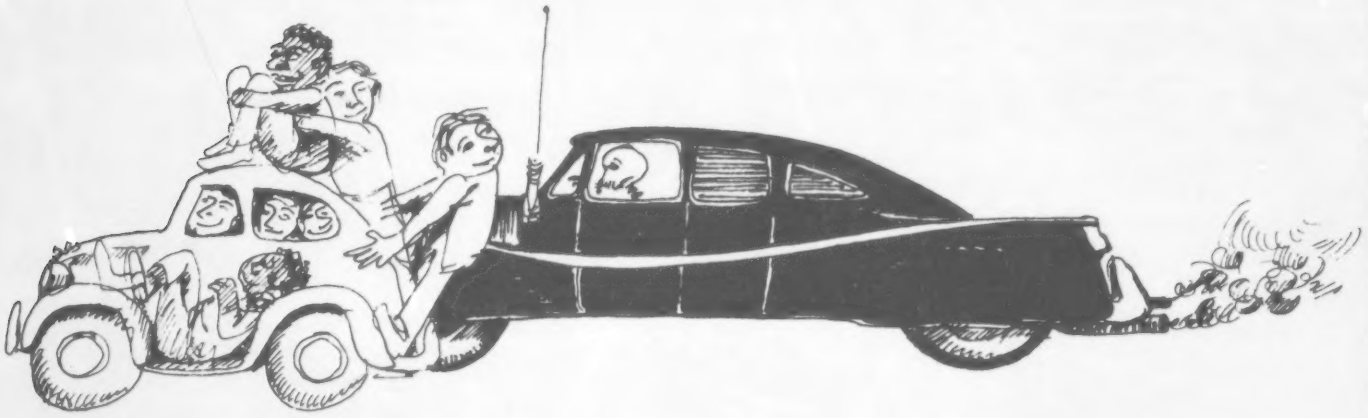
What is the source of pollution? Oil rig, industrial plant, municipal sewage plant?

You, as a polluter yourself, can and probably should:

1 **Buy beverages only in returnable bottles. Return throwaway bottles and glass jars to redemption centers run by the Glass Container Manufacturing Institute in many States. (For a list, write to the Institute at 330 Madison Avenue, New York, New York 10017.)**

2 **Reuse paper and plastic bags from the store.**

3 **Don't use colored tissues, because the dye may form a harmful residue in water.**



4 **Rather than drive to work alone, form a car pool or take public transportation and thus cut down on air pollution by cars.**

5 **Conserve electricity and water at home.**

6 **Use sand instead of de-icing salts. Sand is less destructive of vegetation, highways, and cars, and doesn't pollute ground water.**

7 Try to buy only things packaged in paper or glass. Some other types of packaging cannot be recycled and are virtually indestructible. Write to manufacturers of products packaged in polluting materials and tell them why you can't buy their materials.

8 Form a neighborhood collection system for old newspapers.

9 Locate existing aluminum scrap reclamation centers or establish one. (Ask locally at newspapers, community organizations, beverage retailers, etc.)

10 Store a jar of water in your refrigerator instead of running the tap to cool it.

11 Buy laundry, dishwasher, and other cleaning products with minimum phosphates.

12 Live without whatever electrical convenience products you don't truly NEED.

13 Use and teach others how to use organic farming and gardening procedures; avoid pesticides.

14 Wash your plants with water or mild, nondetergent suds to keep them free of bugs.

15 Use compost piles composed of things like sawdust, corn husks, leaves and grass cuttings, fat-free table scraps, coffee grounds, and tea leaves (small amounts of paper help too).

16 Walk more. Limit use of recreational vehicles and appliances. Skiing, hiking, biking, and canoeing don't pollute.

17 Become concerned with and active in the planning and use of land in your area.

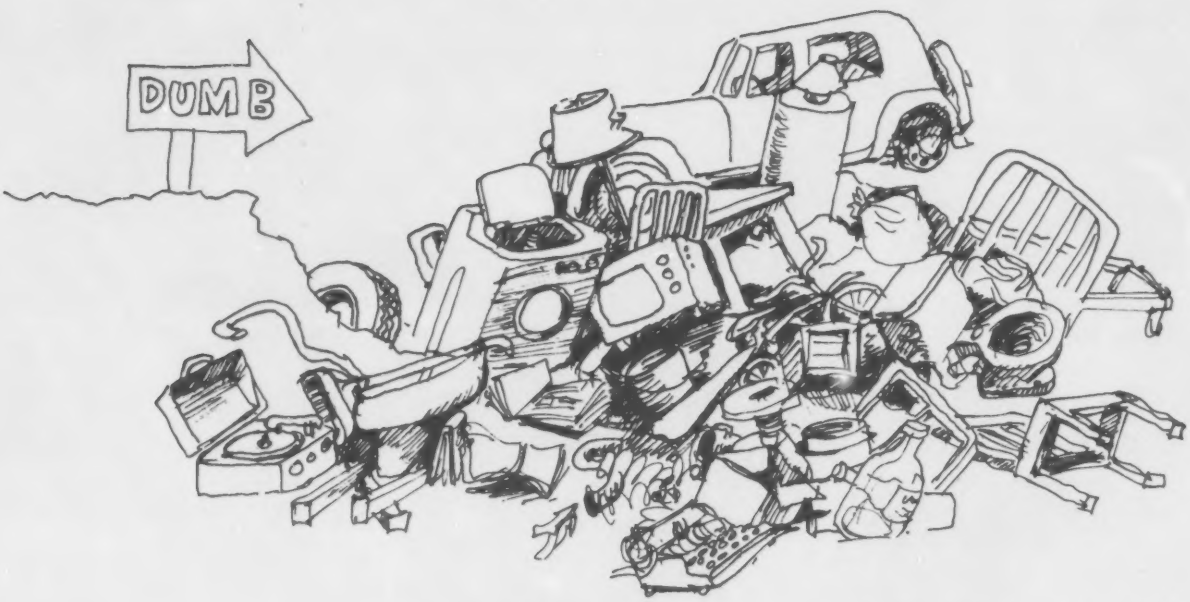
18 Buy gasoline with the least amount of lead required to operate your car satisfactorily.

19 Keep your family's car in good repair.

20 Know where your legislators stand on ecological issues.

21 Avoid littering and clean up any litter you see. If you need a neighborhood cleanup, organize one.

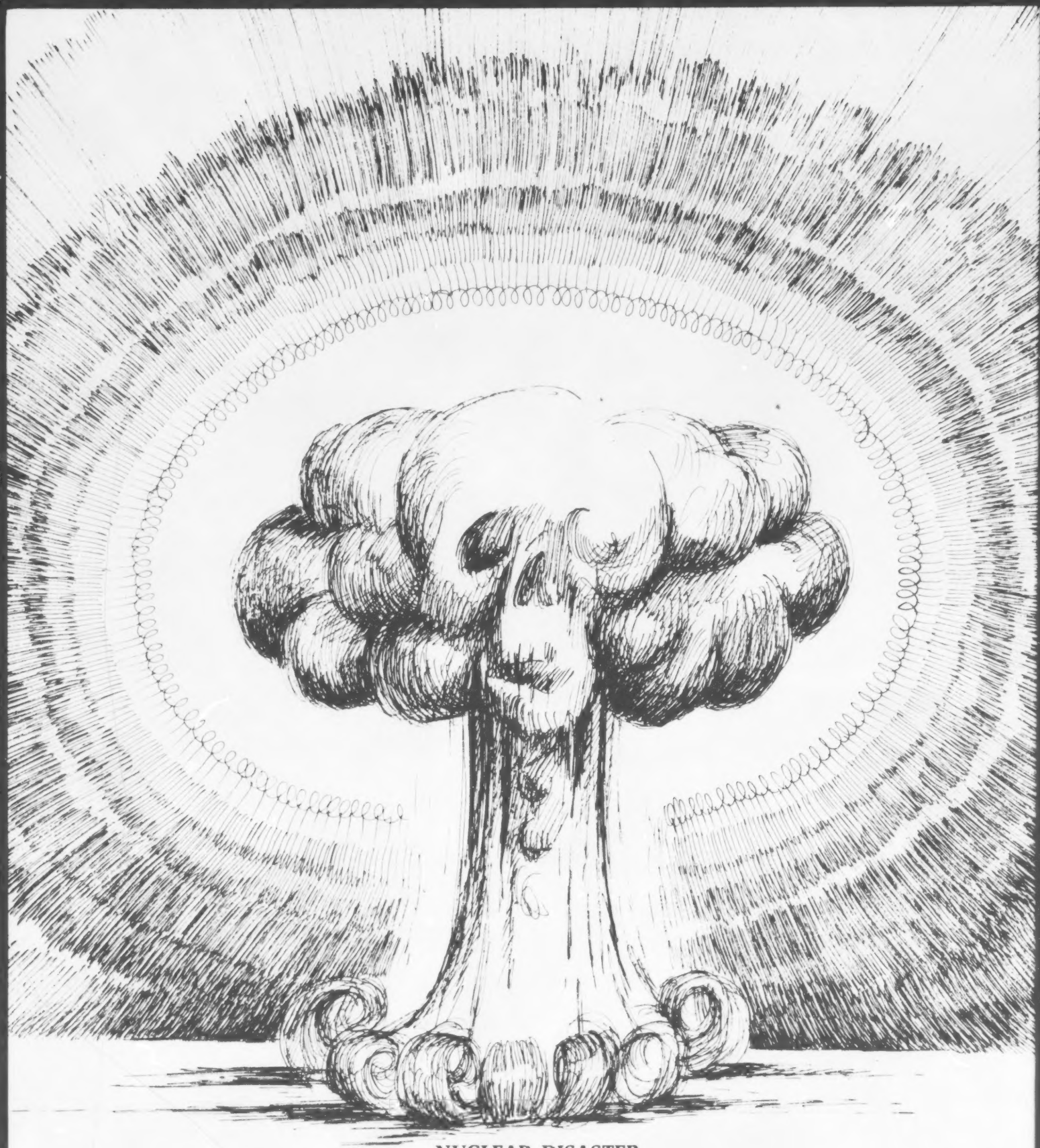
22 Plant trees and shrubs which replenish oxygen in the air; take care of growing plants.



And think up your own solutions to pollution problems. They're probably best of all, especially if you really care what happens to the environment around you.

There's a classic story of how no one thought it was important enough to put up a warning sign on a dangerous curve until someone drove over the edge and got killed. But the sign is up now and still people drive straight for the edge. The main problem is, the driver is *us*.

SAVE AIR
SAVE WATER
SAVE SOIL
SAVE ENERGY
SAVE YOURSELF!



NUCLEAR DISASTER

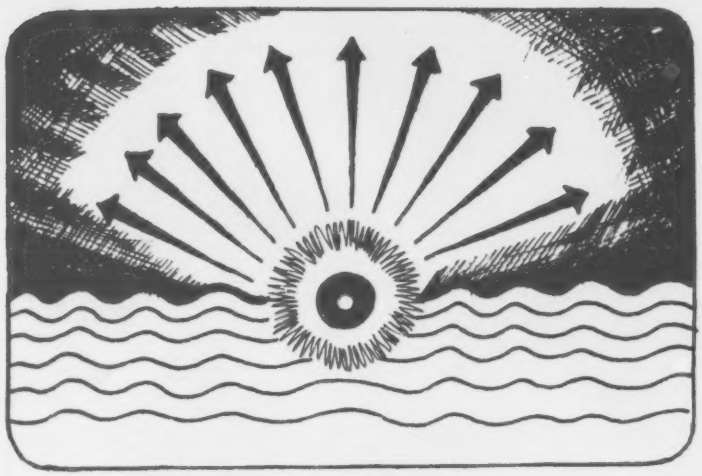
78

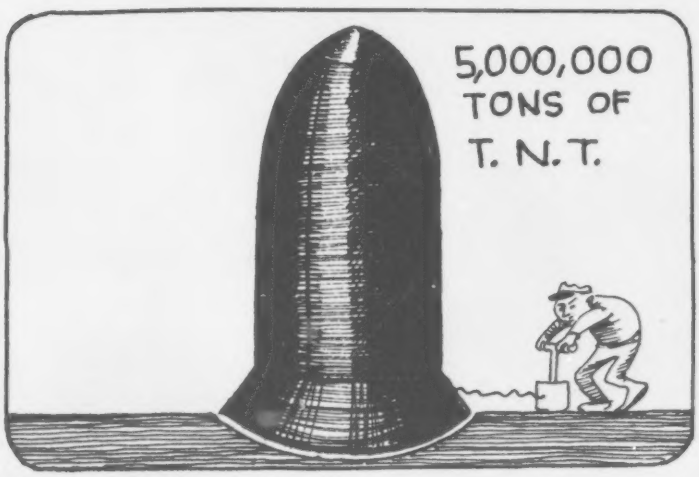
Fallout and radiation have been with us a lot longer than the radioactive fallout which rises in the mushroom cloud of nuclear explosions, and then "falls out." Any body of matter—say from a dust storm or oil fire—picked up into the air, and re-deposited somewhere else, is fallout.

The dust, pumice, and debris that erupted from Mount Krakatoa in 1883, and traveled on winds around the world, was one form of fallout. Nuclear fallout, which is radioactive, is the latest man-made version.

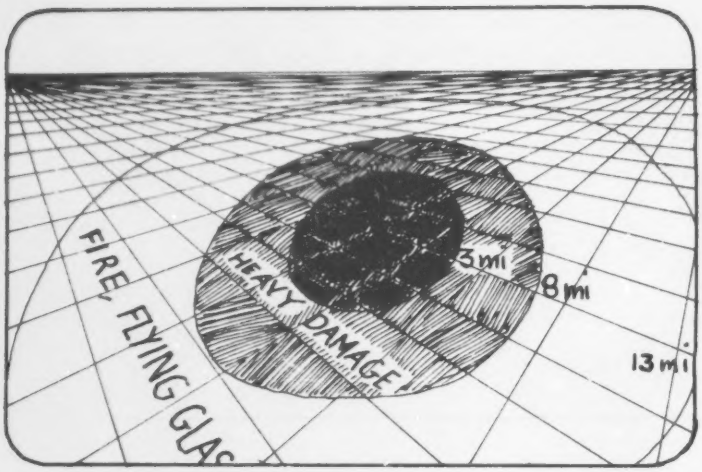
Radiation comes from many sources. One is the energy of our sun (and other suns beyond ours), given off in the form of heat and light rays. We enjoy and rely on them for fuel, suntans, ripening the orange crop, drying up a flood. But we also guard ourselves from the skin burns, drought, and death they cause.

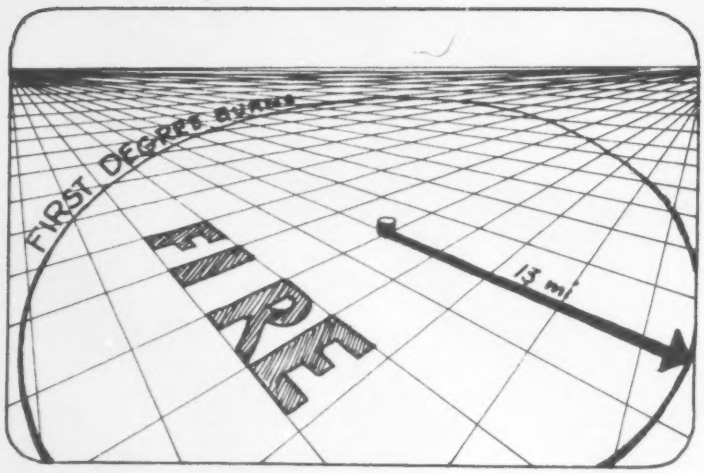
Radioactivity is also energy —but this time the rays come invisibly; alpha, beta, and gamma rays cause varying degrees of silent damage. Alphas cannot penetrate, but can irritate the skin; betas cause body burns; and gammas can go right through you—and thus damage cells, which can make you ill, or kill you. Like energy from the sun, these rays are potentially both harmful and helpful.

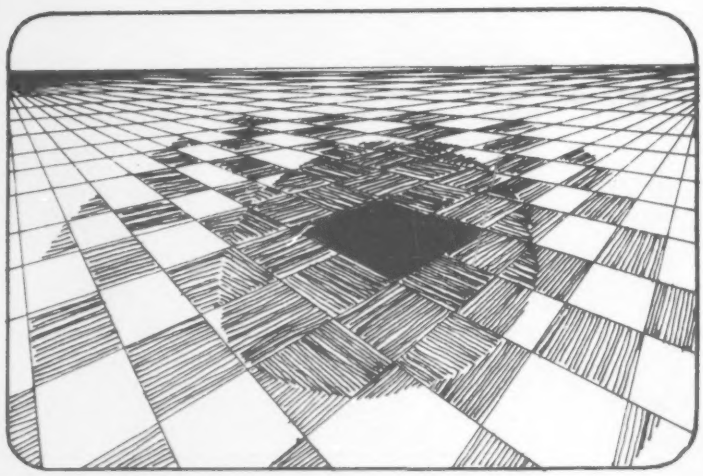




When a nuclear bomb bursts on or near the earth's surface, 50 percent of its total energy goes into blast waves and ground shock. Thermal radiation—heat and light—can cause instantaneous fires and severe skin burns (about 35% of the total energy). Initial nuclear radiation (5% of total energy) is released at the core of the explosion. The remaining energy release (10%) comes as the radiation of fallout.

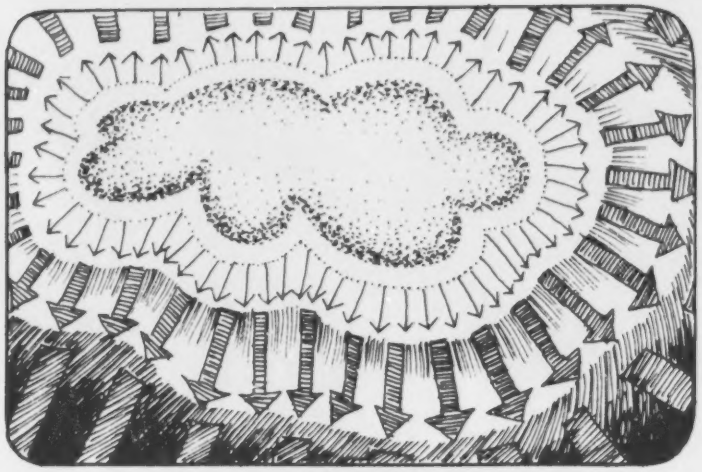






If a 5-megaton bomb (5 million tons of TNT equivalent) were exploded in your living room, everything except specially designed structures in an area extending outward for 3 miles would be totally devastated. Look out your window and think what that means.

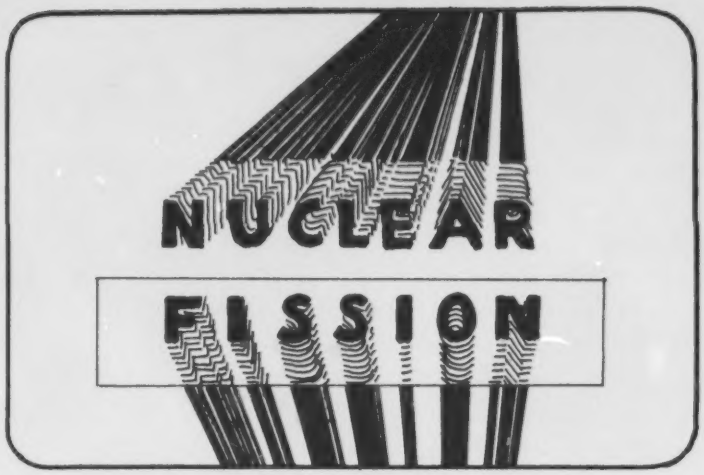
If the 5-megaton bomb were detonated 13 miles away, you could still receive first-degree burns. Think of something 13 miles away. That's quite a distance for heat to travel and still give you first-degree flash burns. The most serious initial nuclear radiation occurs within the 3-mile radius of the severe destruction. Everything here is subject to the blast and heat, so initial nuclear radiation is a hazard only if one is protected from these effects.

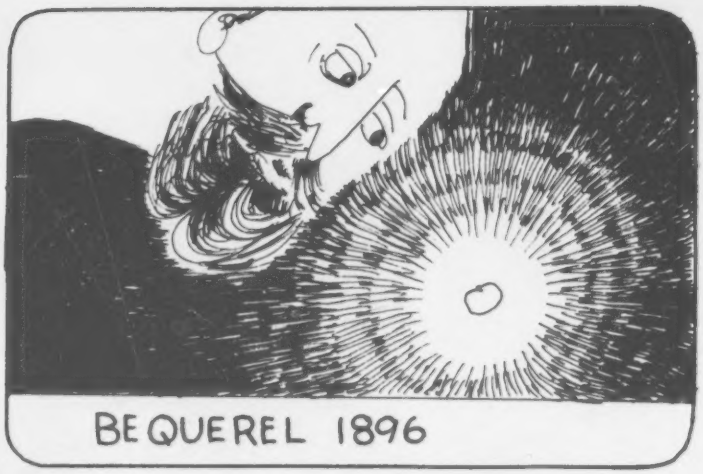


Radioactive fallout is the threat survivors of the initial effects of a nuclear explosion (blast and heat) would have to reckon with. Fallout from a single weapon burst could cover hundreds of square miles. The only virtues of fallout radioactivity are that it decays, or lessens, with time—and that we can shield ourselves from it. The rays of fallout radiation, like light rays, travel in straight lines; and like light rays, can be scattered around a corner. However, they can be absorbed effectively by common, heavy materials, such as earth, concrete, sand, and steel.

Protect Yourself

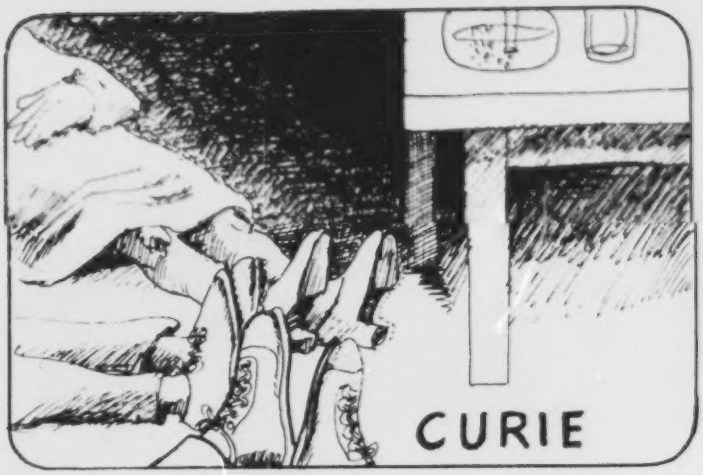
In an emergency, you may be directed to go to a community fallout shelter. Or, you could seek protection in your own home shelter. (For information on home shelters, see the chapter called Home Shelters.) If you are caught short, improvise. Pile protective materials around yourself: piles of newspapers, furniture, sacks of grain. Create your shelter area in an inner room or closet. You can also improvise protection by digging a trench in your yard, and covering it with lumber (or a door) and earth. Stock your home shelter with survival items (see p. 11).

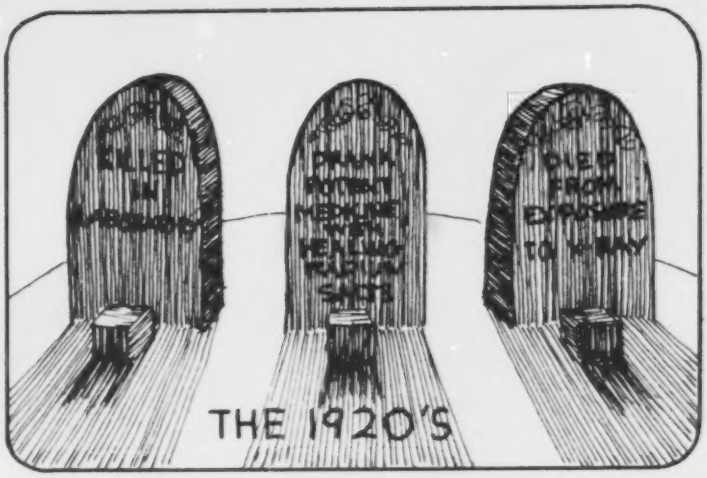


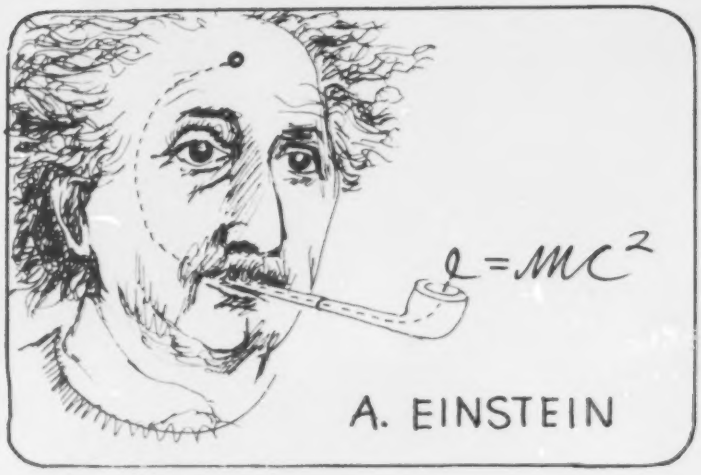


William Roentgen in 1895 discovered invisible, but immensely powerful, energy rays. He tracked them down during his studies of luminescence, when he noticed that the rays he was using caused photographic plates enclosed in a box to become fogged and darkened. At that time, the origin of the rays was unknown, so he christened them "X." We still call them X-rays, even though their source and behavior are now well understood.

Soon afterwards, Henri Bequerel discovered that certain kinds of matter throw off charges of energy; a little like discovering that your baseball sends out radio signals. His discovery meant that matter was not inert; motion was going on inside it.

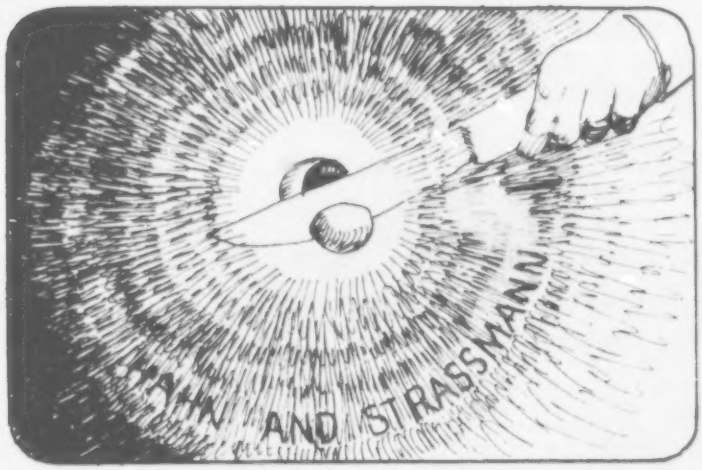


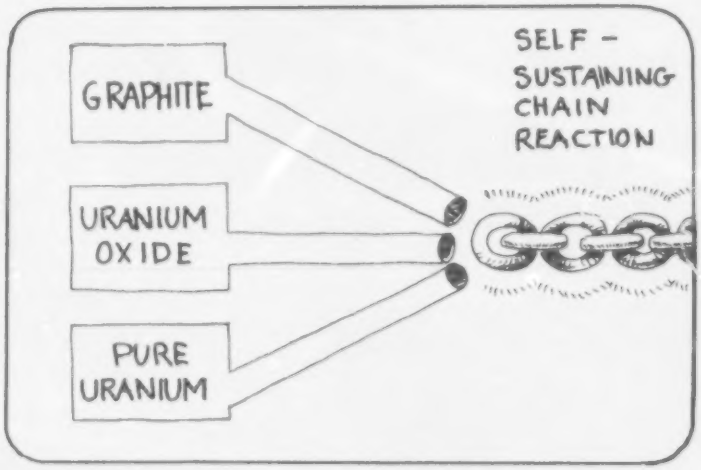




When radioactivity was discovered, scientists were generally unaware of its dangers; but they soon learned. Many experimenters received bad burns from overexposure; and Madame Curié, the French scientist who discovered radium, and two of her immediate family, died lingering deaths. Their knowledge of radioactivity's dangers came too late to save them. Radiation can cause cancer, destroy bones and vital organs, and damage genes.

Bequerel's discovery of radioactivity in 1896 led indirectly to work by the then obscure Albert Einstein. In 1905, Einstein said that matter could be converted into energy. This led to understanding and use of the atom's awesome power.

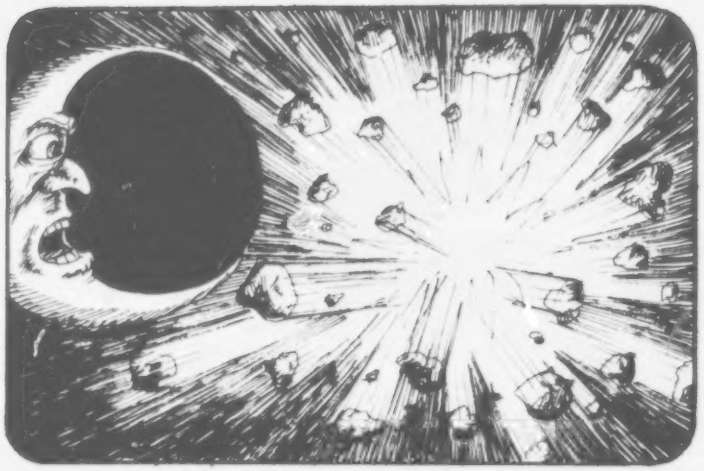


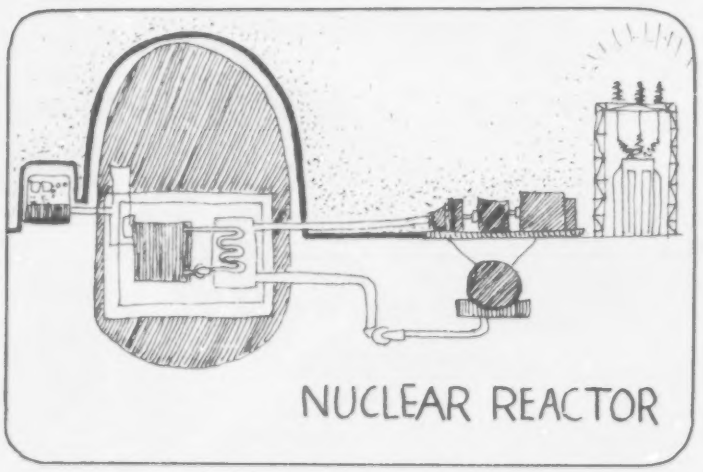


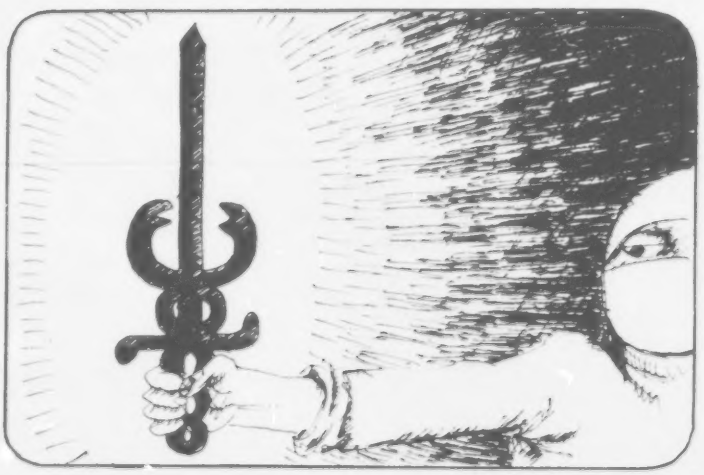
While the deadly nature of radioactive rays was well known in the years following 1900, no organized effort to establish rules to protect people existed until the early 1920's. In 1960, the Federal Radiation Council recommended stringent safety rules for nuclear industry workers, and protection guides for the general population.

In 1938, Otto Hahn and Fritz Strassman, in bombarding the element uranium with a neutron, split the uranium nucleus in two. However, they did not immediately recognize the potential of the results, and it remained for Lise Meitner and Otto Frisch in 1939 to explain properly the fission process and confirm their prediction of an enormous release of energy.

Enrico Fermi, an American-based Italian scientist, dreamed of a chain reaction. If a neutron could split a nucleus, why shouldn't that produce more neutrons, and an endless supply of splitting nuclei? He managed to do it on December 2, 1942, in Chicago, Illinois, in the first operation of a nuclear reactor. His dream had become reality. The military use of this new source of energy was demonstrated when the first atomic bomb was exploded successfully at Alamogordo, New Mexico, July 16, 1945. In the early days of August of the same year, atomic bombs were dropped on Hiroshima and Nagasaki. Their incredible destructive power led to the end of World War II.





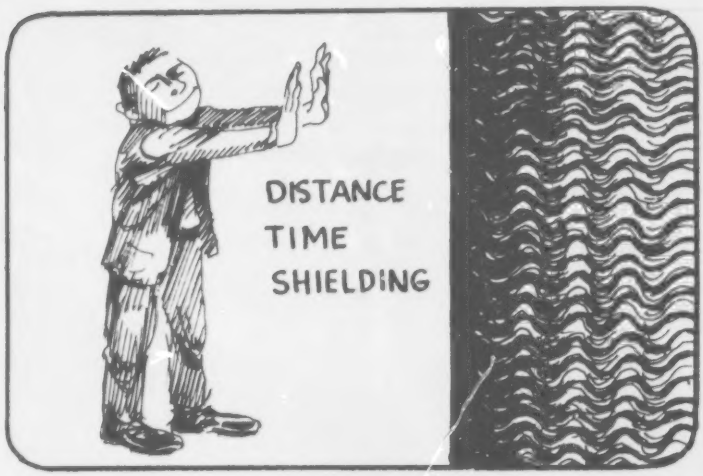


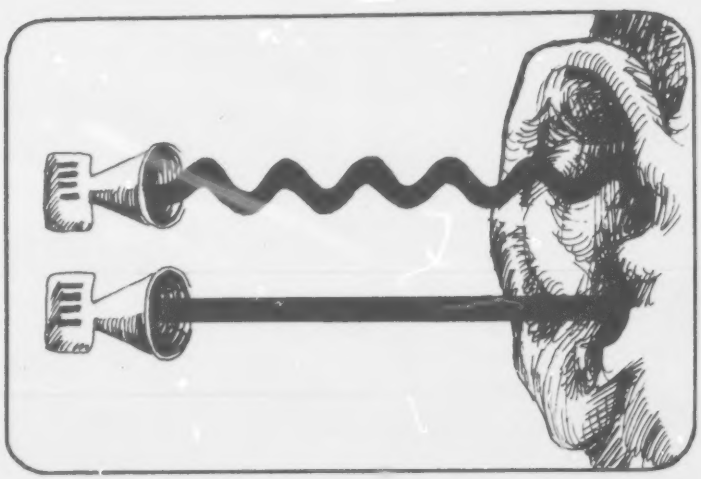
In 1952 and 1954, thermonuclear devices (hydrogen bombs, H-bombs) were detonated at the test site in the Pacific. Fallout from these explosions first made the world aware of the widespread threat radioactivity could pose for the survivors of the immediate effects of nuclear attack.

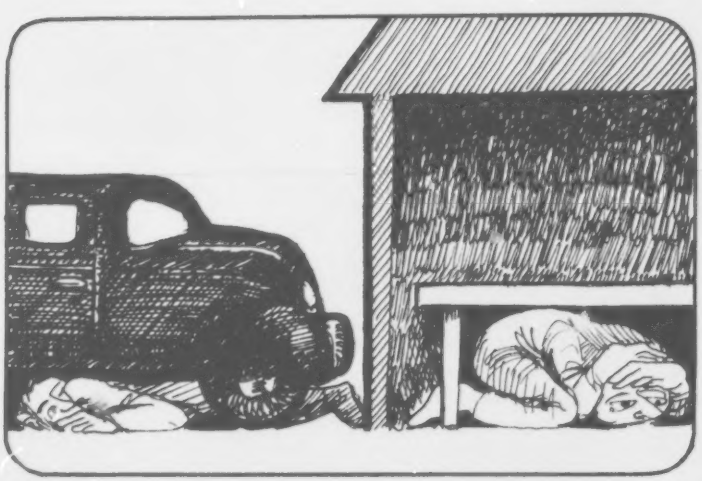
The enormous power of nuclear energy commands mankind's careful attention to the application of atomic energy. As used in the H-bomb, it can pose a terrible, destructive threat; but properly used, it can provide untold benefits for people everywhere.

Reactors in Great Britain and the United States generate electricity to warm and light homes, to make people's lives easier and more comfortable. Radioisotopes are used to diagnose and treat diseases; and in ongoing experiments to yield bigger, better, and more economical food supplies.

Radiotherapy cures certain kinds of cancer and blindness. X-rays are indispensible to modern medicine. Of course, they are used by experts in controlled situations, in carefully measured doses. But the power of radiation for good is considerable.







SUMMARY

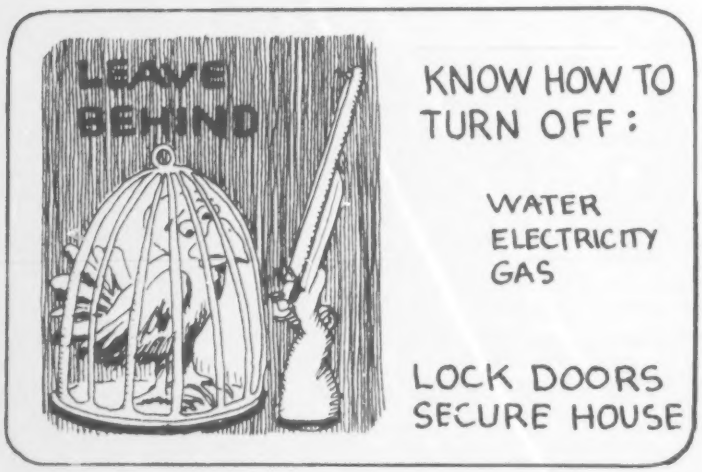
Fallout radiation is the big danger. If you broil in the hot sun all day, you'll be sorry. If you let yourself be bombarded by gamma rays, you'll be sorrier still. Radioactivity decays. Get away from it, stay away from it, barricade yourself until it's faded.

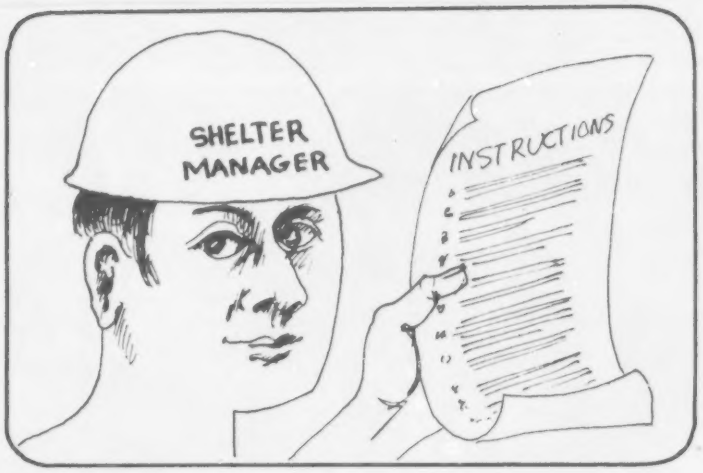
You must have a plan; know what you're going to do when the warning signal sounds. Do you know those signals? What they mean? See the chapter called Warning Systems for details.

Encourage parents to keep sufficient gas in the tank to get to the community fallout shelter in an emergency. But consider that roads may be blocked, and be prepared to get there under your own steam. If you can't make it in time and you have no prepared home shelter, improvise as mentioned earlier.

Check out public fallout shelter location and supplies. Local civil defense officials may ask you to bring additional food, bedding, books, and games. In any case, bring any necessary medication and such things as special diet items for babies and old people. The things you plan in advance to bring, readied in a box or easily carried bag, can mean the difference between a difficult 2 to 14 days, and relative comfort. Take things to share. Think of others as well as yourself. Extra food and water, perhaps extra batteries, a small radio.

Know how to cut off gas, electricity, and water supplies. Check with your local utility company to find out what they want you to do in time of emergency. Don't bring narcotics, alcohol, or pets to the shelter. Don't bring your bongo drums, either. Use your head. Leave plenty of food and water at home for your pets.

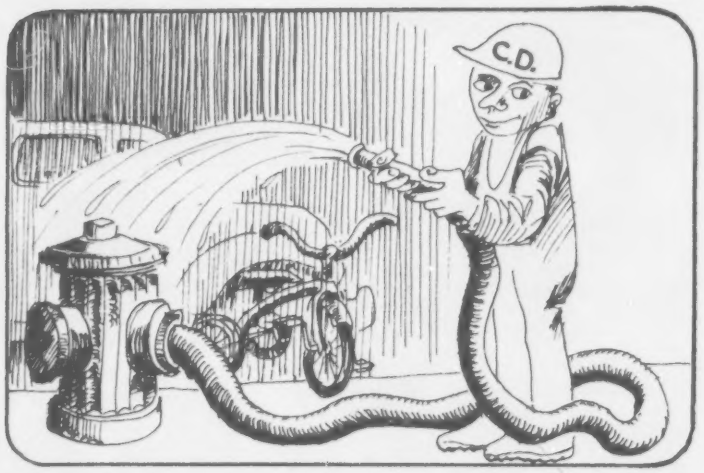


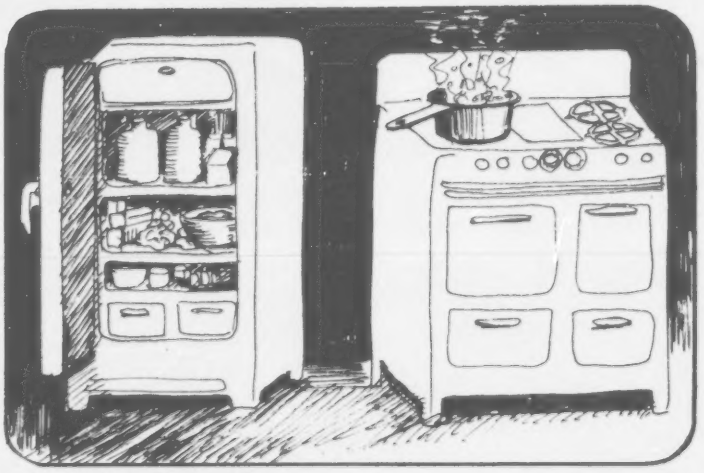


IN THE SHELTER

In the shelter, cooperation is the key word. The shelter manager is trained, and is in charge. Do as he says. Be patient. Be ready to help, and share, with others.

Continue to listen to the radio for the duration of the emergency. It will keep you informed of events, and let you know when the danger from radioactive fallout is over.





WHEN YOU EMERGE

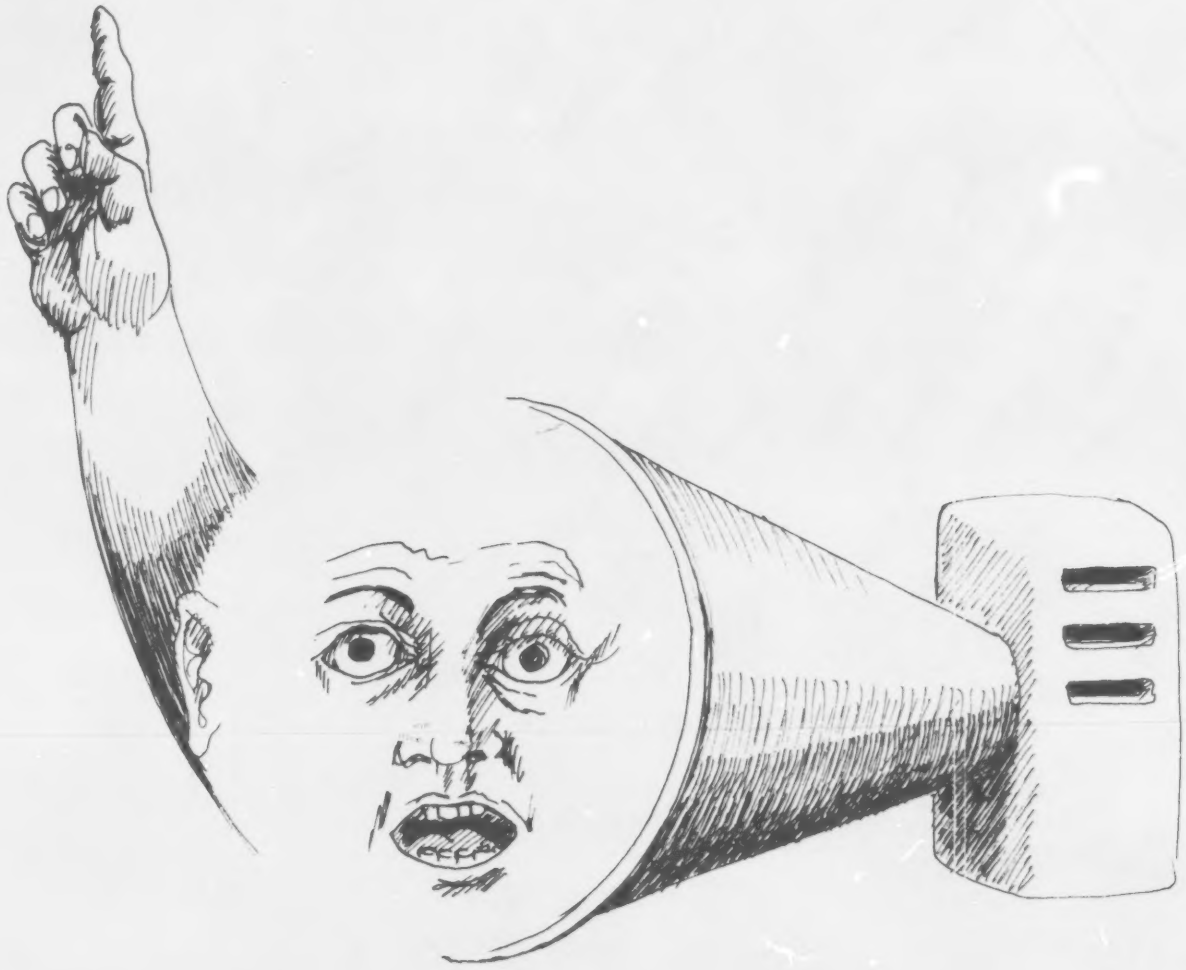
Remember that there may be radiation sickness cases around you when you come out. IT IS NOT CONTAGIOUS. Also, inanimate objects will *not* be radioactive, but may need to have radioactive fallout particles washed or brushed off.

Food in refregirators, freezers, or other containers will not be contaminated. If food has fallout on it, it will still be safe if the fallout particles are removed. Radiation doesn't contaminate water; fallout particles will drop to the bottom. The radio will advise on available food and water.

Centers will help you find clothing, shelter, and medical care; trained teams will remove health hazards. Follow instructions so you can help everyone get back to normal.

Food, tools, medical supplies, and other materials are available all over the country. Everyone will work together to help the community get back to normal. Be prepared to help in that effort. You are not alone, but *you count*.

The South American Indian stalking his prey through the tall grasses knows that the curare on his arrowhead will instantly kill. The doctor who uses it to cure muscle spasms in tetanus and spastic paralysis has a different view of it. Hopefully, eventual worldwide use of nuclear energy will be only peaceful and constructive. Until that time arrives, we must be prepared to survive in nuclear disaster situations.



WARNING SYSTEMS

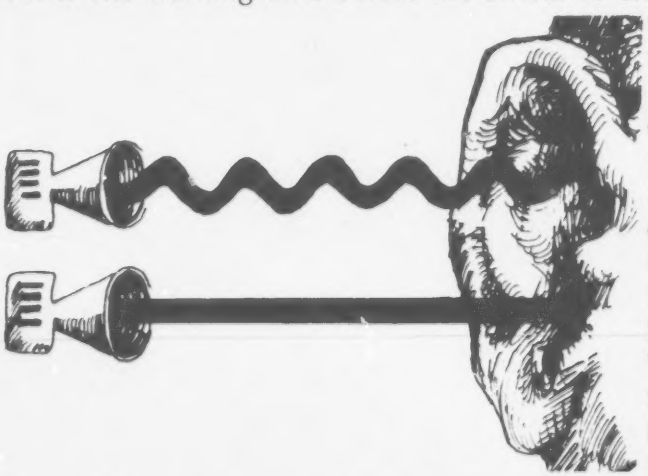
Every creature, every society known to man, has relied for survival on some kind of warning system. Beavers slap the water with their tails at the first hint of danger, and all the beavers disappear. Baboons post sentries on the outskirts of camp to signal alarm with their shrill cries. Soldier ants and termites clack their pincers—which in the colony resounds like a drum—when enemies approach. The ancient Greeks flashed the sun on their shields, the way the Apaches used mirrors. Paul Revere watched for a lantern in a church tower. Modern systems devised by man are more complex, but they serve the same basic purpose—to help protect lives and property—from peacetime disaster as well as the modern-day threat of nuclear attack.

A nationwide civil preparedness system exists in the United States. The system includes warning and communication networks, facilities and instruments to detect and monitor fallout radiation, Emergency Operating Centers from which to direct lifesaving and recovery operations, emergency broadcasting stations, people in local governments who are experienced and trained in emergency operations, citizens who have emergency skills, and military forces ready to help civil authorities and the public in time of emergency.

Many U.S. cities and towns have outdoor warning systems: mostly sirens, with some whistles. Two standard signals are specified by DCPA:

Attack Warning Signal

This signal is intended for use only in case of enemy attack. It is a series of 3- to 5-minute *wavering sounds* on the sirens, or a series of short blasts on whistles, horns, or other devices. This means that an actual enemy attack against the United States has been detected, and that protective action should be taken immediately. The signal probably would be preceded by a period of grave international tension or crisis. The warning time before the arrival of enemy weapons might be as little as 5 to 15 minutes in some locations, or as much as an hour in others.



First awareness of attack could be triggered by detection of rocket launching, or flights of incoming aircraft. Warning would be initiated by the North American Air Defense Command (NORAD), at Colorado Springs, Colorado, and passed along by DCPA officers over the National Warning System (NAWAS) to points at State and local levels. Outdoor warning devices would be turned on from the local warning points. If you should hear the Warning Signal, take *immediate protective action.* Turn on your radio and follow the official instructions you hear.

Attention or Alert Signal

This signal is used by some local governments to get your attention in case of a natural disaster or other peacetime emergency. It differs from the Attack Warning

Signal in that it is a 3- to 5-minute *steady blast* on outdoor warning devices. In many places, the Attention or Alert Signal means that the local government wants to broadcast important information on radio or television, so "tune in."

Weather or Not

Meteorology (the science of weather) has a more useful function than advising what to wear—whether you should leave your house with an umbrella or short sleeves. The U.S. Weather Service has sophisticated weather instruments that can often predict where and when a natural disaster might occur (hurricanes, tornadoes, floods, tidal waves, and winter storms). This news is always broadcast if it will affect people's safety in any way. Depending on where you live, some weather warnings may be more familiar to you than others. If you live in Florida, you will be familiar with hurricane warnings; or if on the Plains, with tornado watches and warnings.

If you take a trip, listen to your car radio, or take a portable radio. Weather warnings on radio can give you a margin of safety—especially if you travel long distances.

A *rumor* is not a *warning!* If you hear a rumor, don't run for the hills or the telephone. The radio or television is your best source of official information and instructions about emergency situations. Use your telephone only to report an emergency. In a disaster, lines should be kept open for official, emergency traffic.

Fall of 1938—War of the Worlds

Intended as a Halloween prank, this broadcast caused hysteria throughout New York and New Jersey. People abandoned their homes and fled in their cars — roads were jammed, and never before had people in all modes of life become so suddenly disturbed as they did on this night. The original broadcast took place at eight p.m. Eastern Standard time on the evening of October 30, 1938. Orson Welles and a group of his Mercury Theatre actors took their places before the microphones in the studio, little realizing what the outcome would be.

What was the message? We were under enemy attack—and from the planet Mars! When the panic was over, the chairman of the Federal Communications Commission called the program "regrettable."[1]

Regrettable—and exciting—and a clear illustration of the fact that rumors often are just that—inaccurate or completely off-base. Find out for sure before taking action.

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[1]From the album, "The War of the Worlds," Orson Welles and the Mercury Theatre Actors, 1938.

HOME SHELTERS

Dan's eyes were open now. It should be morning, he thought. But it was still pitch black, and stuffy. If it was night, where was his window? The street lamp outside? And if it was morning, why wasn't it light? He sat up on one elbow.

Dan remembered now. He was in the top bunk of the fallout shelter. Jerry was in the bunk below. Their parents had built and stocked the shelter in a corner of their basement; and then they decided to try it out.

What if this were a real attack, Dan wondered. That would be something else. Radiation caused by nuclear explosions would be scary—and could be a danger everywhere for people who survived the blast and heat of the explosion. At least you could protect yourself from radiation and the danger would fade with time. The radiation would decrease rapidly in the first 24 hours, and then start leveling off.

Crash! There was a shattering of glass. The peanut butter jar had fallen off a shelf onto the glass water jug. Both had shattered.

Dan watched his father carefully sweep the glass into the "dry garbage" sack. "Obviously, no more glass in the shelter," Dad said. "Plastic bottles for water; and stuff like jelly, and peanut butter, in plastic containers. And it needn't be beans for breakfast every morning, either. A little planning could provide variety, as well as nourishment. Corned beef hash, canned spaghetti, peaches, and dry cereal. No problem there."

By ten-thirty, the boys were bored to the teeth. This was the big problem—with feeling cramped a close second. His parents were reading. He and Jerry worked awhile on a model jet fighter. But there was no glue. No heater either. No television, no fresh milk, no candles, no kerosene lamps.

The radio was on now. This helped relieve the monotony. And he reflected that in a real emergency, the radio would be their link with the outside world. Through radio, they would receive official information and instructions—and they would learn when it would be safe to come out of shelter.

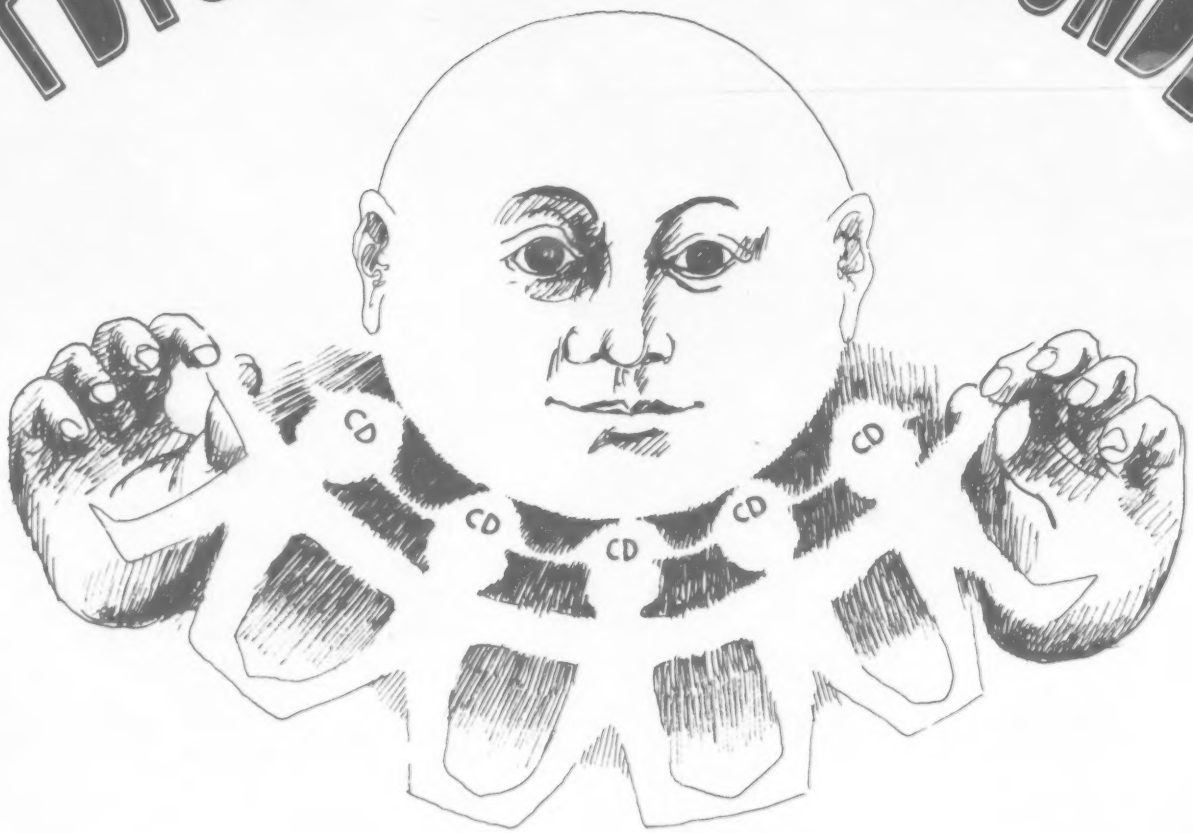
Dan felt sleepy. The air in the shelter was becoming warm and sticky. He longed for the outdoors and sunshine. Kids playing outside the shelter were yelling, having a good time. That made it very hard to wait until evening, when they would be leaving the shelter.

Despite this, he knew that in a real attack situation he would be grateful for the protection from radiation provided by the thick walls and roof of this shelter. He remembered that if there really had been a nuclear explosion, they probably would have to stay in the shelter for at least 24 to 48 hours—or even longer, depending on the outside level of radiation. And, they might even have to dig themselves out. That's why they needed shovels, axes, and ropes.

Dan was glad this was only a trial run. But he was also glad they'd done it. It would make it easier to cope, if it ever came to the real thing.

Suddenly, it felt good to be alive!

PSYCHOLOGICAL RESPONSE



So far we've talked about survival mostly in terms of physical action: when to run, where to go, what to eat, who to call. Now it's time to talk about *mental* action —what to do with your head in a crisis.

We've all heard stories about how people flip out in drastic, mindboggling emergencies—like the lady who took her children down to the beach to watch the tidal wave come in, or the seaman who, during the Pearl Harbor attack, ran back into a burning ship to put on his new shoes. These stories are incredible, and even amusing, in the telling. But *during* a calamity, survival can depend on how you cope with emotional shock and stress. Imagine the cable car you're riding runs wild down a hill; or that, standing in line at the bank, the customer in front of you decides to make a large withdrawal with a gun. Or, say you're famous for an after-dinner creation, flaming blintzes. One evening you're a little slapdash with the brandy, and the tablecloth is flambé, along with the dessert. All the ways you react to these events are called "Psychological Responses." They can save not only your linen, but your life.

Two things matter: having a clear picture of what's happening, and keeping cool. Take a simple event like falling out of a tree house. You know you've fallen, you feel the blood gushing, and what you normally do is limp home, feeling sorry for yourself, and get the thing fixed. But what if you're knocked silly, or seized by fear? Jumping blindly up, you run into the road, where a car hits you. That takes care of your head wound, and possibly all your other problems.

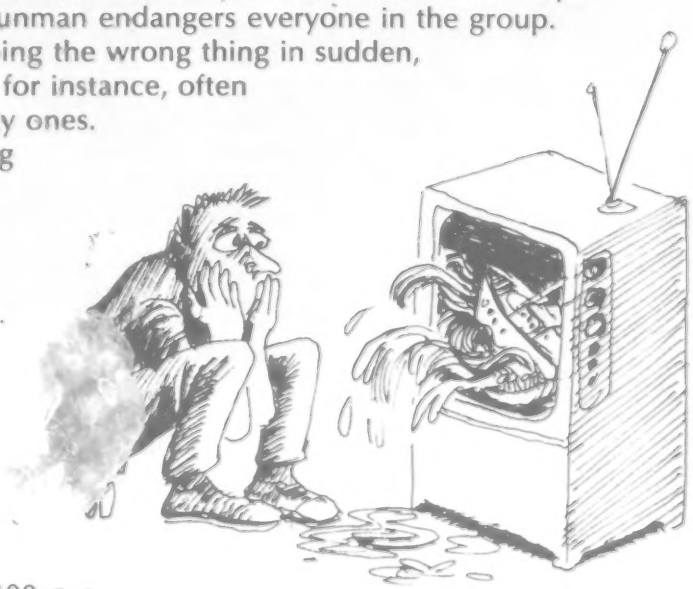
Now imagine you're in line at the bank. The customer in front of you whips out a gun, and yells, "Everybody freeze!" The sensible thing to do is just that. Freeze. But what if the sight of the gun terrifies you? Instead of standing there, you either faint, run, or leap at the bandit. Of the three, fainting is the only reasonably safe course. Running or leaping may get you shot, depending on the gunman's psychological reaction.

Similarly with the dining room fire: having recognized it, you put it out; or you run for help. Either response is sensible. An irrational response is to stand there, fascinated by the flames.

Your reactions to peril rarely involve just you. Darting into the road after your fall from the tree affects the driver of the car that hits you, and affects also the police and medics, your family and friends, and the man you work for on Saturdays. Losing your wits when confronted by a gunman endangers everyone in the group.

There is a greater chance of doing the wrong thing in sudden, strange situations. People in a shipwreck, for instance, often rush for one lifeboat, ignoring other empty ones. Others leap from windows high in burning buildings when help is just at hand. Miners trapped by caveins have used up a day's supply of oxygen in a few hours of frantic activity.

Familiar situations tend to lesse panic. You are more likely to keep yo cool. That's one good reason for read this disaster booklet. If we can't simu late a flood, a hurricane, or a nuclear blast, reading and talking about anothe



experiences is the next best thing. It is a way of preparing—of becoming familiar with disaster.

As we've seen throughout this book, preparation must be a daily fact of life, even if it costs a little extra effort. Few would go so far, however, as the lady who bought a pain-killer, and then gave herself a bad burn to see if the medicine worked. (She reported it was only fair.) This section deals with *mental* preparation, knowing how to handle your emotions in an emergency. Department of Defense research shows that in a disaster, "Knowledge of how to cope with the situation is usually the single most important factor in saving lives and minimizing damage."

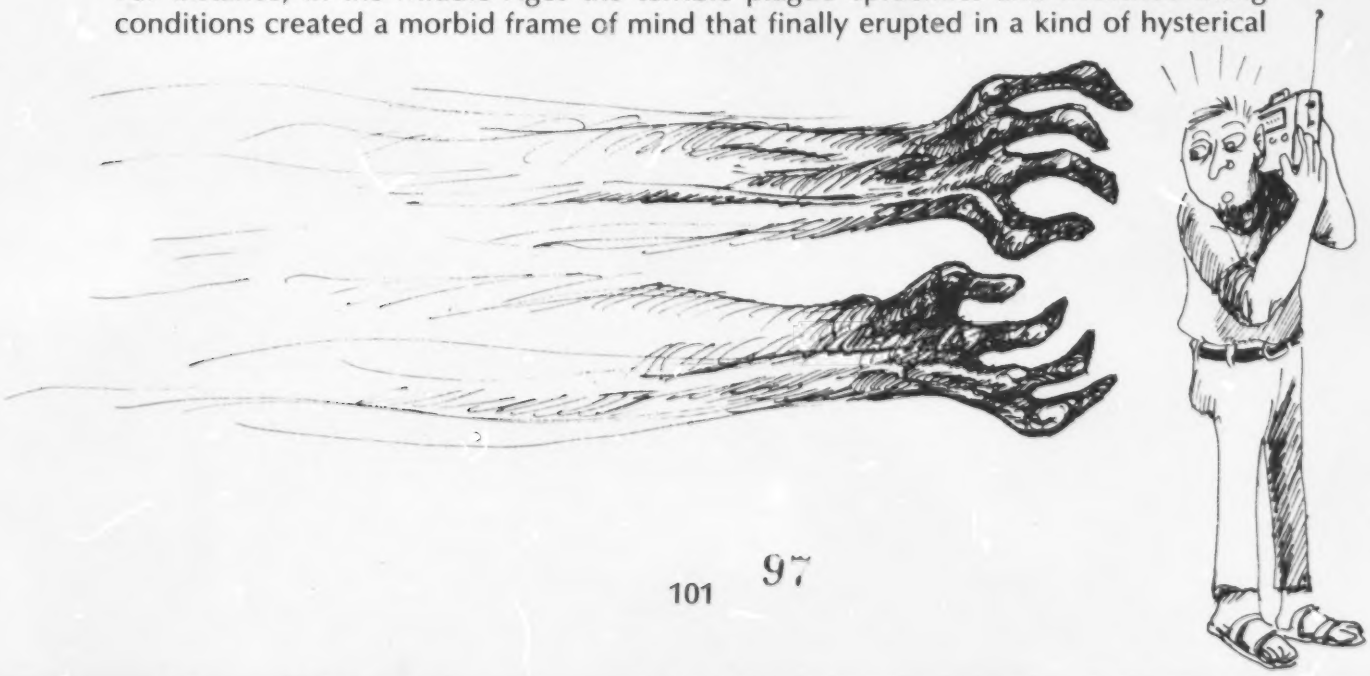
Panic and Paralysis

The greatest dangers in a crisis are letting your fears run away with you, and being stunned into motionless despondency. This usually results from a lack of information, or the feeling that no effective action is possible and the situation is hopeless.

On October 30, 1938, the Mercury Radio Theatre gave America a Halloween thrill by broadcasting a drama about a Martian invasion. The trouble was, it didn't sound like a drama. The skillful use of news bulletins, on-the-scene reporting, and other documentary techniques, made it sound like the real thing. Thousands of people listening in their living rooms believed that Martians had landed, had ravaged Paris and New York, and that the human race had only a few hours or days to live. Some people became hysterical, fainted, planned suicide, ran blindly into the streets. Others sat limp in their living rooms waiting for the end. Some jumped into their cars and raced off to anywhere. A few grabbed what supplies they could and headed for the hills. Finally, people at the radio station discovered what was happening and started trying to calm the public.

The critical part of the story is that many of the people tuned in that night were able to tell, after a little while—simply by using their heads—that it was pure fiction. These people simply sat back and enjoyed a clever and creative radio show.

In other words, a lot depends on your mental disposition—what we might even call a certain "willingness" or readiness to see the worst and become hysterical. For instance, in the Middle Ages the terrible plague epidemics and wretched living conditions created a morbid frame of mind that finally erupted in a kind of hysterical



religious mania. People roamed the land, mutilating their flesh with whips and scourges to expel the Devil, or became swept up in wild dance, joggling, screaming, moaning for days, until they collapsed from exhaustion. In some parts of Europe, whole villages did frantic marathon dances through the countryside because they believed tarantulas were under their skin.

Panic and hysteria—even less dramatic kinds than these—are rare. They come from *not knowing the facts* and *not keeping cool.* Sometimes it seems easier to surrender to the jolts of adrenalin that shoot through us, than calmly to figure out what exactly is happening.

Once in awhile, running away is a sensible reaction. A flash flood, an out-of-control car aimed at *you*, a charging bull, ought to push your "run" button. But too often it's a substitute for cool, sensible behavior.

Other Places, Other Times

Cassius was a cool, well-heeled winemaker, spending the weekend in the quiet shade of his villa, just outside Pompeii. Cassius sighed with content. He loved to get away from the noise and congestion of Rome. As he sat among his marble statues, sipping a tall one, he heard a thunderous roar that shook the ground and spilled the drink all over his new tunic. He stood up, looked around, and saw belching flames and a black cone of smoke pouring out of the volcano Vesuvius a few miles away. Almost immediately, it started to hail little pieces of pumice stone. Sulphurous fumes filled his nostrils, and the ground reeled under him. Cassius had to act fast! What should he do?

If this were merely a severe windstorm, ducking into his wine cellar would be ideal. But if he took shelter there now, a wave of steaming mud boiling towards his house would cook him alive. If it had been a nuclear blast (and he had known what a nuclear blast was), he could get behind mattresses, papers, grain sacks, or concrete, to shield himself from radiation. But the gas fumes and raining ash would soon suffocate him if he tried that now. "No, the thing to do when a volcano erupts," Cassius said to himself, "is split!" He dashed into the street and thumbed a ride with the first chariot that came by. He made it safely. Many of his neighbors waited too long to make up their minds, trying to decide how much silver plate they could carry. They're still there.

As the World Grinds to a Halt

Hilda was a handwringer. She thrived on her daily soap opera, but fell apart at even the most minor real-life crisis. Puttering in the kitchen one afternoon, the comforting strains of the TV's afternoon melodrama were interrupted by a news bulletin. The announcer reported that the local dam, miles up river, showed signs of collapsing. The order was—"Evacuate. Now!" Hilda felt as helpless as Dorothy facing the tornado,

but she had a sudden cold thought: there was no wizard to rescue her. She was on her own. She took a deep breath, ran into the house, grabbed her car keys, Klutz (her poodle), her high blood pressure pills, and a spare blanket. Her car was all set, and she was away in record time. Hilda had never coped so well with an emergency in her life. But then, her life had never depended on it before.

It isn't easy to tell who is going to hang on and who is going to fall apart in a crisis, or why. *Knowledge of how to cope with the situation* can mean a lot more than knowing first aid, or how to find food. *Knowing yourself*, for example—what rattles you, what your first impulses will be.

People have a variety of emotional and physical reactions in stress situations. We all suffer in varying degrees. Physical reactions include sweaty palms and feet, tense muscles, trembling hands and voices, nausea and vomiting, frequent urination, and breathlessness. We may laugh and cry hysterically, become unusually sensitive to noise, and feel irritable and restless; or we may even temporarily lose the ability to act at all.

In most cases, these reactions pass quickly, but these and even more intense reactions may occasionally continue beyond the initial shock period, and make recovery efforts difficult. A stable emotional climate is essential to those efforts. Keeping your head will help others keep theirs. Some brief rules for helping the psychologically distressed: Try to comfort them, without encouraging them to feel sorry for themselves. Don't chide them, and don't indicate resentment of their reactions. Instead, try to get them involved in simple tasks, preferably as part of a group effort.

Someone once paraphrased Kipling's optimism in saying, "If you can keep your head while all about you are losing theirs, then you obviously don't understand what's happening." This is more witty than true. Confusion, fear, and shock come naturally and immediately with any catastrophe. But most people keep their heads, and refuse to give in to panic and selfishness. That often makes the difference between disaster and survival.

Let's look at how three people reacted to the atomic blast at Hiroshima: Mr. Tanimoto, a Christian cleric; Mr. Fukai, his friend; and an unnamed young mother.

Mr. Tanimoto's will power, concern for others, and energy brought comfort to the dying, and saved many lives. Shaking off the paralyzing shock of the horror he saw around him, his first act was to help a woman and child to shelter. In the following days, he brought water to men and women too sick to move, and ferried survivors across the river to Asano Park. He rescued people from drowning; organized work parties to put out fires and to find and distribute food. People took strength from his behavior. His frend Mr. Fukai, in despair at the devastation, ran back into the flames to die. The unnamed mother simply sat and stared into space.

For a group of Hiroshima survivors, then, one man's actions meant life and death. Few get the chance to behave as valiantly as Mr. Tanimoto. But our best will be good enough if we remember two things: (1) we must adjust quickly, and (2) our behavior affects others. In a crisis, we can remind ourselves that it is not science fiction; it is real, and like everything else in our world, conforms to the process of reality. Plug into it. Disaster studies show that people respond well if they know what's going on, if they have some purpose and are organized, and if they have a pipeline to the outside.

Labor Day

Earl Slocum was a man who knew all about hurricanes. On Labor Day of 1933, he sat in his muggy parlor, on the southern tip of Florida, and mulled over the Great Wind. Christopher Columbus must have sailed with a lucky star, he thought, to avoid a hurricane in a Caribbean October. Earl had seen the aftermath of the 1926 disaster, and he'd helped at Lake Okeechobee in 1928, when 2,000 people were killed, and as many were wounded. As Earl watched the barometer fall, he thought apprehensively about the 500 veterans and their families living on the Florida keys, working on the great highway that was to link Miami to Key West. They were pretty much unprotected. He hoped the train that was coming to evacuate them would make it in time.

It didn't. And the fact that only 400 people were killed in that storm was due to the courage and energy of a few men. One of them was Doc Bassett, the veterans' camp doctor. In spite of his own wounds, he helped pull the injured from water, trees, and wreckage, treating where he could, encouraging when encouragement was all he could give.

Most people who ventured out into the calm eye of the storm didn't live to tell the tale, but the people who survived the disaster were generally those who stayed calm. One man strapped himself to a tree with his belt. Another man, when his house disappeared in a gust of wind, clung to the broken fronds of a palm tree with such determination that though he lost consciousness, he was still wrapped around the tree when he came to. Keep it in mind; when disaster strikes, be calm and analyze the situation; then try to take reasonable action to protect yourself and, if possible, the people around you.

Communication

Two heads are better than one in any disaster. Human contact is vital in emergency. After Hiroshima, the people lying helpless in Asano Park were heartened when a naval launch patrolled the river, explaining what had happened, and promising help. Try to stay in touch. The radio will keep you informed. If it's not working, seek out people, friends or neighbors, and create your own channels of communication.

The first thought after disaster usually is for other members of the family. Many people do nothing until they're sure wives, husbands, and children are safe. Then they turn to professional and community duties. A fireman, who fought a fire alone after his town was struck by a tornado, later said: "All the rest of the firemen had relatives who were hurt, and they stayed with them. Naturally they looked after them. If it hadn't been that my wife was all right, this town probably would have burned up. It's hard to say, but I kind of believe I would have been looking after my family, too."

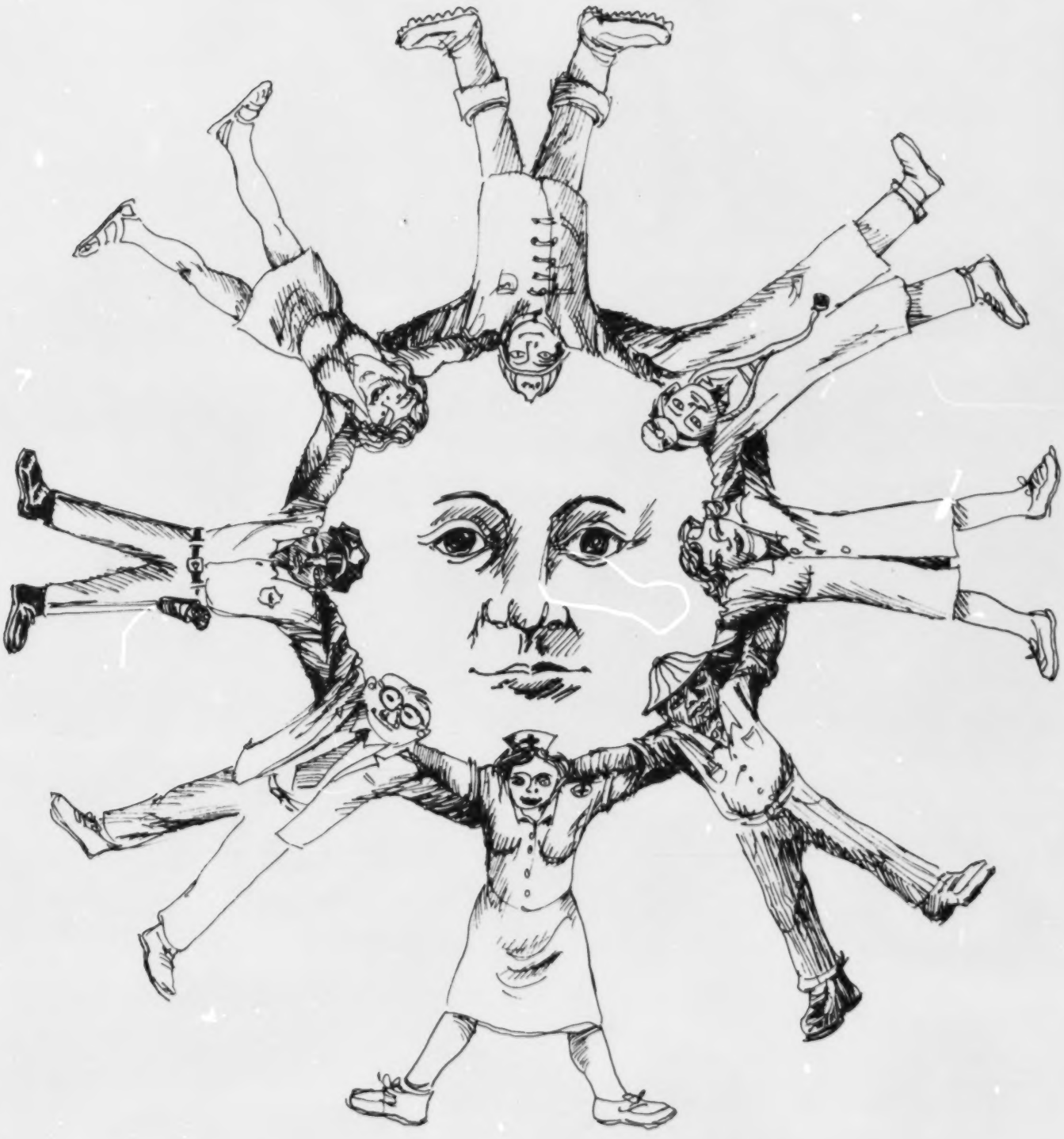
During emergencies, we quickly reorder our priorities about possessions, too. For instance, a prized $200 10-speed bike may not rate a second glance compared to a hastily collected box of food. Jobs, homes, and status, which take such effort and energy in normal times, cease to be important. Everyone is in trouble at the same time, and social distinctions tend to evaporate. The sharing of loss and danger create a bond; the temporary liberation from normal worries and inhibitions leads to a feeling of solidarity. The result of this kind of cooperation is a give-and-take that helps compensate for the sorrow and stress people are under. Personal warmth and direct help are in abundance.

Afterwards

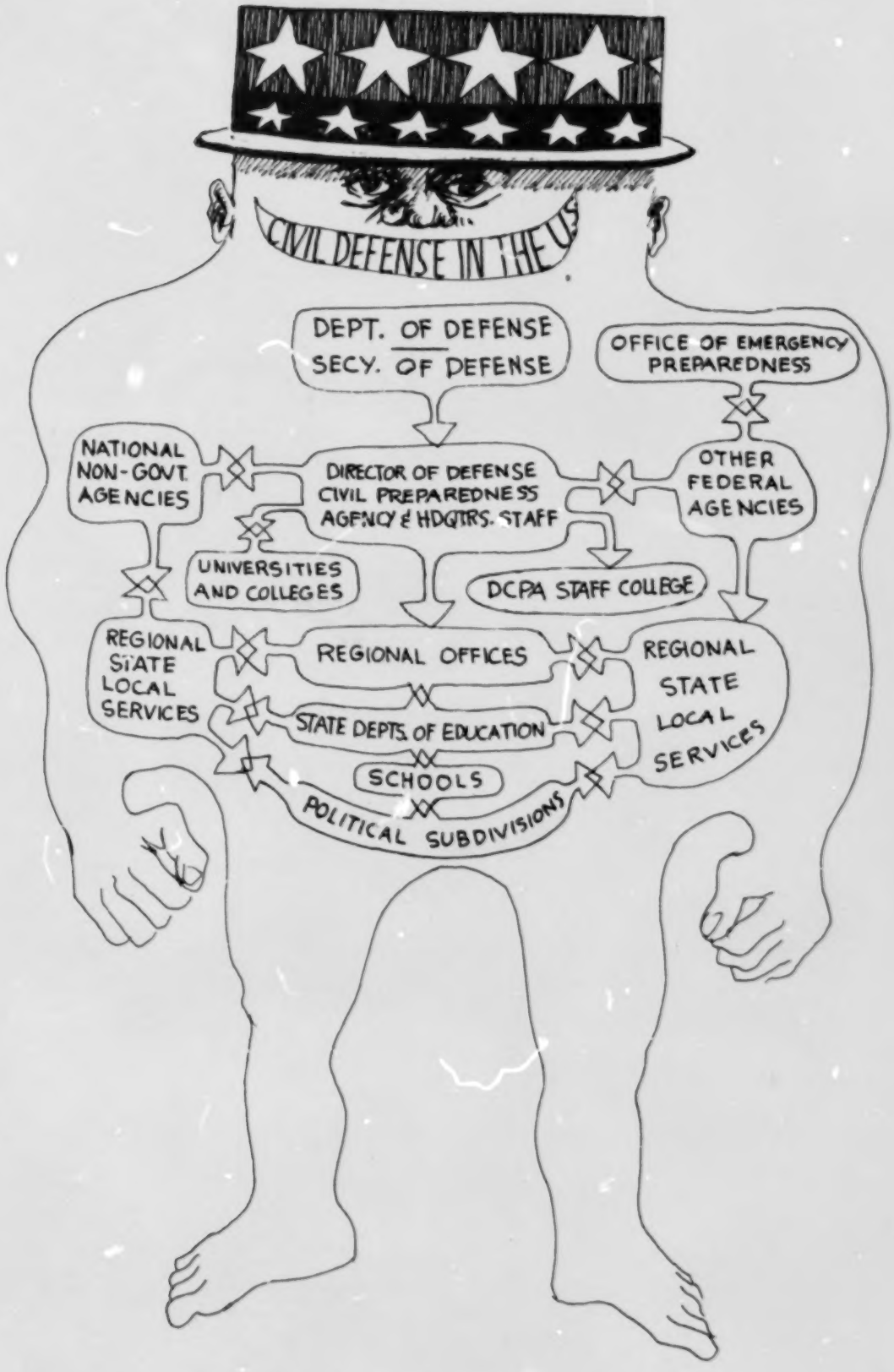
What happens when it's all over? The dust has cleared, the immediate danger has passed. Seeing death and destruction, one is aware of the randomness of that destruction, and of the narrowness of one's escape. We may experience a delayed-action fear of death, unleashing a new rash of symptoms: nervousness, headaches, sleeplessness, and so on. Your vulnerability will make you want to get back to feeling good about yourself and your community. This often takes the form of making great efforts to clean up the havoc, and of taking precautions against its happening again. Many people will be so glad they are alive that they end up feeling guilty about it. They try to get rid of this guilt, again by working towards rebuilding the community. All of these feelings then, have a positive side.

Remember: in an emergency situation, assess the facts, keep your head, think of others, and act calmly and directly. You may never have to cope with disaster; but in case you do, everything depends on knowing how.

Community and



Government Action



Here's a diagram that shows how the federal effort fits into your own community's preparedness activities:

Emergencies can bring out the best in people—or the worst. Which it will be depends mainly on how well a society is prepared to act quickly and effectively.

To most of us, local governments are invisible—until something goes wrong. When a child falls down an old mine shaft, an oil refinery blows up, a dam breaks, or a social crisis erupts, *then* we remember that local government personnel are always there to meet any major crisis.

To understand how all these people prepare for any possible emergency or disaster, and what part they play in coping with it, you have to look at the whole picture. You ask:

WHO ? WHERE ? WHAT ? WHEN ?

Who?

Not a special group of people. Just like the Plains Indians—when faced with attack or starvation, *the entire village* was their civil defense system—so with us: the men and women responsible for our civil defense are local policemen, firemen, doctors, nurses, engineers, auxiliaries, and *you*. The mayor (or chief executive) is the official in charge.

The civil defense director reports to the mayor, or other local chief executive. The director helps other departments of local government and the private sector plan and prepare for emergency situations. He also directs and coordinates emergency services during a disaster. And of course, volunteers are an important part of the total civil defense effort.

Where?

When an emergency strikes, key officials of your local government work in an Emergency Operating Center. From that communications and control point, the mayor (or other chief executive) makes key decisions, in close cooperation with the police chief, fire chief, city engineer, and others who, in turn, direct their own forces.

What?

Civil preparedness is many things to many people. It is preparing—long in advance—for everything that can possibly go wrong in an emergency: knowing where all supplies, emergency workers, and facilities are, and how to put them all into coordinated action when disaster comes. It saves lives, limits damage, and speeds recovery in any type of emergency or disaster—including attack.

When?

Before something goes wrong, during, and after. Local government offers us information on how to train, plan, and prepare for any kind of disaster. It develops and regularly revises emergency operations plans for the best possible coordination and most effective action. It provides and tests local warning devices. It sets up communication channels (tied to a national network) so that warnings, information, and instructions will be received by everyone. It develops a community shelter plan for all its citizens, and maintains public fallout shelters. All these tasks *precede* an emergency; *prior planning* can prevent an emergency from becoming a catastrophe.

The Federal Government's Role

These kinds of planning and emergency actions cited above are local functions. Your national government—through the Defense Civil Preparedness Agency in the Pentagon—also helps each community by:

Maintaining a nationwide warning and communication system that alerts your area if a national emergency should arise;

Distributing information (like this handbook) to help every citizen prepare for his role in any emergency or disaster;

Helping State and local governments prepare for and operate during emergencies. Assistance is financial, material, and advisory.

Supplying schools with teaching materials that will help you prepare yourself for survival.

The Director of the Defense Civil Preparedness Agency reports directly to the Secretary of Defense. There is a small DCPA headquarters staff in the Pentagon, and eight regional offices throughout the country. DCPA works with the 50 States, five territories, and the District of Columbia; and with more than 3,000 counties and 17,000 incorporated local governments. In addition, DCPA works with some 30 other federal agencies which have specific emergency responsibilities assigned by executive orders.

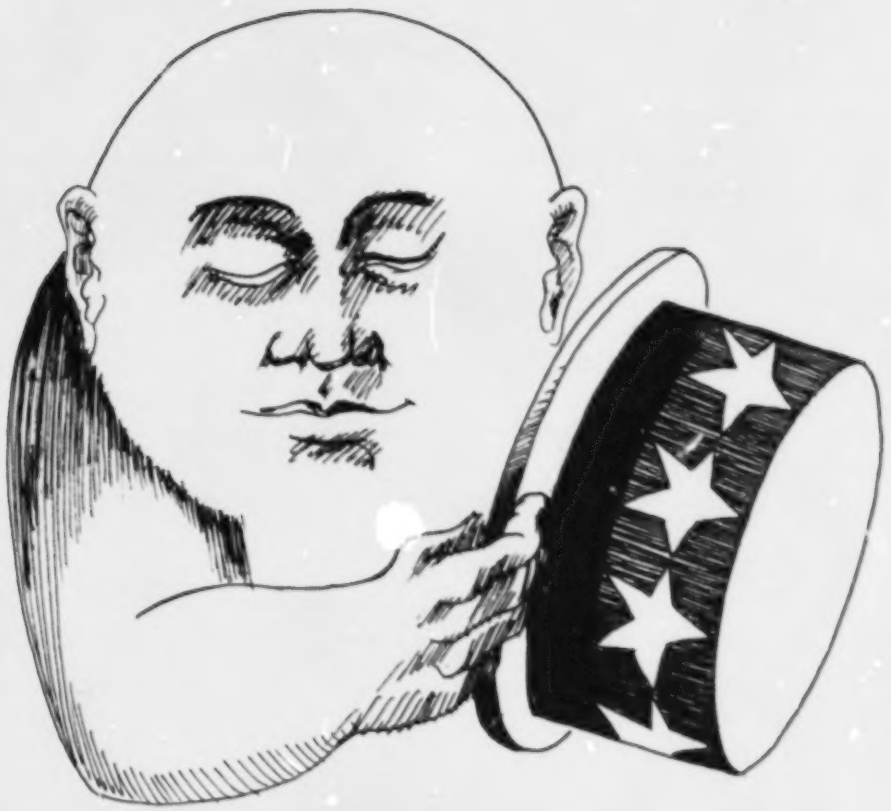
Over the years, the Agency has provided support to all levels of government in many major emergencies. DCPA also coordinates with certain other government agencies to help prepare individuals and communities for disaster.

Lots of other nongovernmental agencies also take part in this cooperative effort. Universities, colleges, and State departments of education help too. Their civil preparedness programs give information to your parents and your teachers, and train radiological monitors, architects, and engineers. The DCPA Staff College at Battle Creek, Michigan, trains State and local civil defense officials so they'll know how to plan, manage, and act effectively.

Federal, State, and local civil defense, or civil preparedness organizations—units of government—work to help you and your community plan for disaster, or to deal with it effectively if it occurs.

To succeed in saving lives, limiting damage, and speeding recovery, they need *your* cooperation too, both in preparing beforehand, and working with others during and after disaster.

We can best sum up civil preparedness with the words a poet wrote 400 years ago: ***Readiness is all.***



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